LEVEL OF UTILIZATION OF PERSONAL PROTECTIVE EQUIPMENT AMONG WORKERS IN GRAIN AND OIL SEED MILLING INDUSTRIES IN NAIROBI CITY COUNTY, KENYA

ANNAH MUMBUA KYALO (BSC, PH)
Q57/21919/2012

DEPARTMENT OF COMMUNITY HEALTH

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DECLARATION

This thesis is my original work and has not been presented for a degree in any other university.

Signature…… Date …….

Annah Mumbua Kyalo

Q57/21919/2012

Supervisors: We confirm that the work presented in this thesis was carried out by the candidate under our supervision.

1. Signature …… Date……

Dr. Justus O.S. Osero

Community Health Department

2. Signature …… Date……

Dr. Peterson N. Warutere

Environmental Health Department

DEDICATION

This study is dedicated to my beloved husband Godfrey for his love, patience, guidance and resources commitment during my studies. Also to my children Sally, Justina, Sharon and Donson for their overwelming encouragement through out the entire study period.

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ABBREVIATIONS AND ACRONYMS

BSL	-	Bureau of Labour Statistics
BSC, PH		Bachelor of Science Public Health
EASH	-	European Agency for Safety and Health
FGD	-	Focus Group Discussions
GNP	-	Gross National Product
HSE	-	Health Safety Executive
ILO	-	International Labour Organization
KAM	-	Kenya Association of Manufactures
KU-ERC	-	Kenyatta University Ethical Review Committee
MOH	-	Ministry of Health
MOPHS	-	Ministry of Public Health and Sanitation
NACOSTI	-	National Commission for Science Technology and Innovation
OHS	-	Occupational Health and Safety
OSHA	-	Occupational Safety and Health Administration
PHOs	-	Public Health Officers
PPE	-	Personal Protective Equipment
WHO	-	World Health Organization
WIBA	-	Work Injury Benefits Acts

OPERATIONAL DEFINITION OF TERMS

Food Manufacturing Industries – These are the industries that transform raw ingredient products into products for intermediate or final consumption.

Hazard - This is a potential source of harm or adverse health effect on a person or persons.

Occupational Injuries – These are any physical injuries resulting from an occupational accident at the work place.

Occupational illnesses – These are conditions that results from exposure to a physical, chemical or biological agent in a work place to the extent that the normal physiological mechanisms are affected and the health of the worker is impaired.

Occupational Health Safety – A cross-disciplinary area concerned with protecting the safety, health and welfare of people engaged in work or employment. The goal of all occupational health and safety programs is to foster a safe work environment.

Personal Protective Equipment – is any material, device, equipment or clothing which is used or worn by a worker to protect them from exposure or contact with any harmful material or energy which may cause injury, disease or even death to the worker.

Risk – Is the likelihood that a person may be harmed or suffers adverse health effects if exposed to a hazard at the workplace.

Utilization – The use of PPE consistently and appropriately to prevent injuries and illness.

Workplace Hazard - Is a situation in the workplace that has the potential to harm the health and safety of the people.

Level of Use of PPE – The extend of use of PPE by age group, gender and frequency.

Punture – An injury that is caused by a sharp pointed object that pierces or penetrates the skin causing a wound.

ABSTRACT

Personal Protective Equipment (PPE) is any material, device, equipment or clothing used or worn by workers to protect them from exposure or contact with any harmful material or energy which may cause injury, disease or even death. The study assessed utilization of PPE among workers in grain and oil seed milling industries in Nairobi City County. Despite the benefits of using PPE, little information has been documented especially among workers in the food industries not only in Kenya but globally .The study adopted a cross sectional descriptive design. Purposive sampling technique was used to select Nairobi City County. Simple random sampling was used to select 3 industries that were included in the study. Random sampling technique was also used to select a sample of 342 workers from the selected industries. Questionnaires and observation checklists were used to collect both quantitative and qualitative data which was analyzed using SPSS version 20 and the results presented in form of graphs, figures, frequency tables and narration. Chi- square was used to test the research hypothesis at $p<0.05$ significance level. The study results showed that majority of workers in these industries were below 35 years (59.9%), who were male (57.49%), married (72.9%), and with secondary school education (36.3%). Approximately (45.1%) of workers confirmed having suffered various forms of injuries .The occupational injuries experienced by the workers vary with demographics with cuts being the most prevalent injury (40.3%), followed by abrasions (31.2%), with burns being least prevalent (6.6%). Generally, male workers below 35 years of age dominated the injury cases with head, arms, legs, and chest emerging to be the body parts most affected. The injuries were most caused by body stress and knocks by objects. Majority of the workers (73%) confirmed to have suffered occupational illnesses with occupational asthma (23%) and skin dermatitis (18%) dominating. Less than half of the workers (45.1%) were found to be using PPE. Hand gloves, dust masks and overall were the types of PPE mostly used by workers in preventing injuries and illness. The factors that emerged to significantly influence PPE use included acceptability, availability, attractive and not using PPE despite being trained and aware of the hazard. There was no significant relationship between lack of coworker/supervisor influence to use of PPE and social demographics. It is recommended that employers and other stakeholder intensify their roles on PPE policy guidelines, training and awareness campaigns, compliance surveillance on PPE use by all workers in these industries as well as ensure a safe working environment. Employers should ensure that PPE are available, accessible, well fitting and comfortable to wear and that they are used appropriately and consistently by the workers at all times. Ministry of labour and its partners should carry out capacity building for staff in these industries to enable them provide more PPE and hence increase its utilization.

CHAPTER ONE: INTRODUCTION

This chapter introduces the study. It gives the background information of study, statement of the problem, justification, hypothesis, objectives and conceptual framework among other sections.

1.1 Background of the Study

Personal Protective Equipment (PPE) is any material, device, equipment or clothing which is used or worn by a worker to protect them from exposure or contact with any harmful material or energy which may cause injury, disease or even death to the worker (Pyrek, 2011). According to Torp (2005), the PPE often used in the food industries include gloves, Slip-resistant safety boots, overalls, earplugs, helmets, goggles or face shields and disposal masks.

The use of PPE is a universal and legal requirement to protect workers against occupational injuries and illnesses in their workplace. These personalized items are very useful, as without them, workers could be exposed to a variety of toxic substances, chemicals, radiation, or incidents, which could result in occupational diseases, injuries, or even fatalities (OSHA, 2009). Although personal protection is often seen as an inexpensive solution of controlling occupational hazards, little consideration is given to the selection of suitable and effective devices, the maintenance of the devices and to the training of persons using the devices (Pyrek, 2011).

A study by Fierro (2013) found that workers in grain and oil seed milling industries are exposed to numerous hazards that can be prevented through the use of PPE. Another study done on grain and oil seed milling industries in Al-Khobar Saudi Arabia further revealed that about 60% of workers did not use any PPE (Taha, 2010). Other studies done in Nigeria, South Africa, and Ghana have particularly shown that most occupational injuries and illnesses are caused by inhalation of toxic dust and chemicals and that precautionary measures against exposures to

hazards at the workplace by using PPE are still generally poor or nonexistent (Muula *et al.*, 2010).

In Kenya a study by (MOH, 2007), showed that 58% of workers in the grain and oil seed industries lack sufficient access to occupational health services, especially PPE, exposing them to occupational hazards, injuries and illnesses which sometimes are fatal. Workers in these food industries are exposed to numerous hazardous risks that need attention. It is against this background that this study was conceived to assess utilization of PPE among workers in grain and oil seed milling industries in Nairobi City County, Kenya.

1.2 Statement of the Problem

The availability, access, and proper utilization of PPE are important in a country and across all industries, but more so in the grain and oil seed milling industries where there is a lot of physical and manual activities. This is particularly because occupational injuries and illnesses pose major public health and developmental problems which, result in serious health, social, and economic consequences on workers and their employers (ILO, 2008).

Worldwide 2.3 million workers succumb to injuries/illnesses every year, corresponding to 6000 deaths every single day (ILO, 2008). Globally, the grain and oil seed industries have one of the highest injury rates in the food manufacturing sector and accounted for 43.9% of all injuries in 2006/2007 (HSE, 2007). Recently, it has been confirmed that about 65 % of workers in grain and oil seed industries suffer from a high rate of injuries due to poor compliance to PPE use in their work place (BLS, 2010). While employers strive to procure and provide PPE as required by legislation for employees, the equipment is not used effectively and this is further compounded by lack of information about PPE, negative attitudes towards using them, or lack of

encouragement by the management. Others blame the workers' ignorance among other factors found to result to increase in occupational injuries and illness.

According to Wafula et al., (2013) data on occupational injuries and illnesses among workers in manufacturing industries are often unavailable and when they do, are incomplete, unreliable or generally describe poor occupational health situations among workers. This study is therefore an attempt to unravel the nature of PPE services offered, injuries and illness suffered, level of PPE use and the factors influencing PPE utilization among workers in grain and oil seed milling industries in Nairobi City County, Kenya with a view of recommending best practices to minimize injuries and illnesses.

1.3 Justification of the Study

Occupational injuries, illness and even deaths are serious public health concerns. Everyone must work to earn a living. All of us must also work for economic development of our countries. This means that people spend most of their lifetimes working and in their work places, some five and others six days in a week. The work environment is therefore very important as it is the commonest setting in which occupational injuries, illness and even deaths occur. Yet, studies have shown that more than 90% of these injuries are preventable by the adoption of safety measures, appropriate and consistent use of PPE (Chepkener, 2013).

In Kenya, Nairobi City County is the commercial hub of the country, housing many of the food manufacturing industries. Therefore, most of the grain and oil seed milling industry workers work and reside within the County. This geographical location then presents the ideal cluster of the required grain and oil seed milling industry workers best for investigation of the nature of exposures to occupational injuries, illnesses and PPE utilization at work environments in Kenya.

The study also comes at an ideal time when the level of industrialization is politically encouraged and increasing in Kenya as indicated in the Vision 20 30.

In recent study, Wafula et al., (2013) concludes that, despite the importance of using PPE to control occupational injuries and illnesses, very little information has been documented in the study area. Workers in grain and oil seed milling industries are exposed to numerous workplace hazards that expose them to occupational injuries and illnesses which can be prevented by use of PPE appropriately and consistently.

1.4 Research Questions

1. What are the common types of self reported occupational injuries and illnesses among workers in grain and oil seed milling industries in Nairobi City County?
2. What is the level of use of PPE among workers in grain and oil seed milling industries in Nairobi City County?
3. What are the factors influencing the use of PPE among workers in grain and oil seed milling industries in Nairobi City County?

1.5 Null hypothesis

Utilization of PPE is not influenced by availability, accessibility, and consistency of PPE usage among workers in grain and oil seed milling industries in Nairobi City County, Kenya.

1.6 Objectives of the study

1.6.1 General objective

To assess utilization of PPE among workers in grain and oil seed milling industries in Nairobi City County, Kenya.

1.6.2 Specific Objectives

1. To establish the common types of self reported occupational injuries and illnesses among workers in grain and oil seed milling industries in Nairobi City County.
2. To determine the level of use of PPE among workers in grain and oil seed milling industries in Nairobi City County.
3. To identify the factors influencing the use of PPE among workers in grain and oil seed milling industries in Nairobi City County.

1.7 Significance of the Study

The results of this study will be of invaluable use to policy makers and the government of Kenya as they reflect the situation on the ground in regard to PPE utilization in grain and oil seed milling industries in Kenya. The government will use the study results to enhance the industrial workers' safety policy documents. Other stakeholders, especially the workers' Unions and employers will use the results to educate workers on the importance of PPE in work places. In this way, proper administrative measures will be put in place with a view of ensuring compliance with government policies, laws and education regarding PPE availability, access and utilization. Such measures are necessary in improving and encouraging the utilization of PPE among workers of these industries to help reduce injuries, illnesses and deaths. The study's findings also provide baseline information for related studies in the area.

1.8 limitation and Delimitation of the Study

1.8.1 Limitation

The study was limited to only three out of nine industries operating within Nairobi City County geographical area and which were presumed to be perfect representation of all the facts about PPE utilization in the industry in Kenya. Also, obtaining information from the workers was

interrupted by the busy working environment and fear of disclosure of sensitive or unauthorized information. The respondents' education levels in this industry also presented some challenges in understanding some questions and hence some of the participants did not respond to all the questions. For these occurrences, some data collection tools such as focus group discussions and key informant interview guide emerged to be unfeasible for the study.

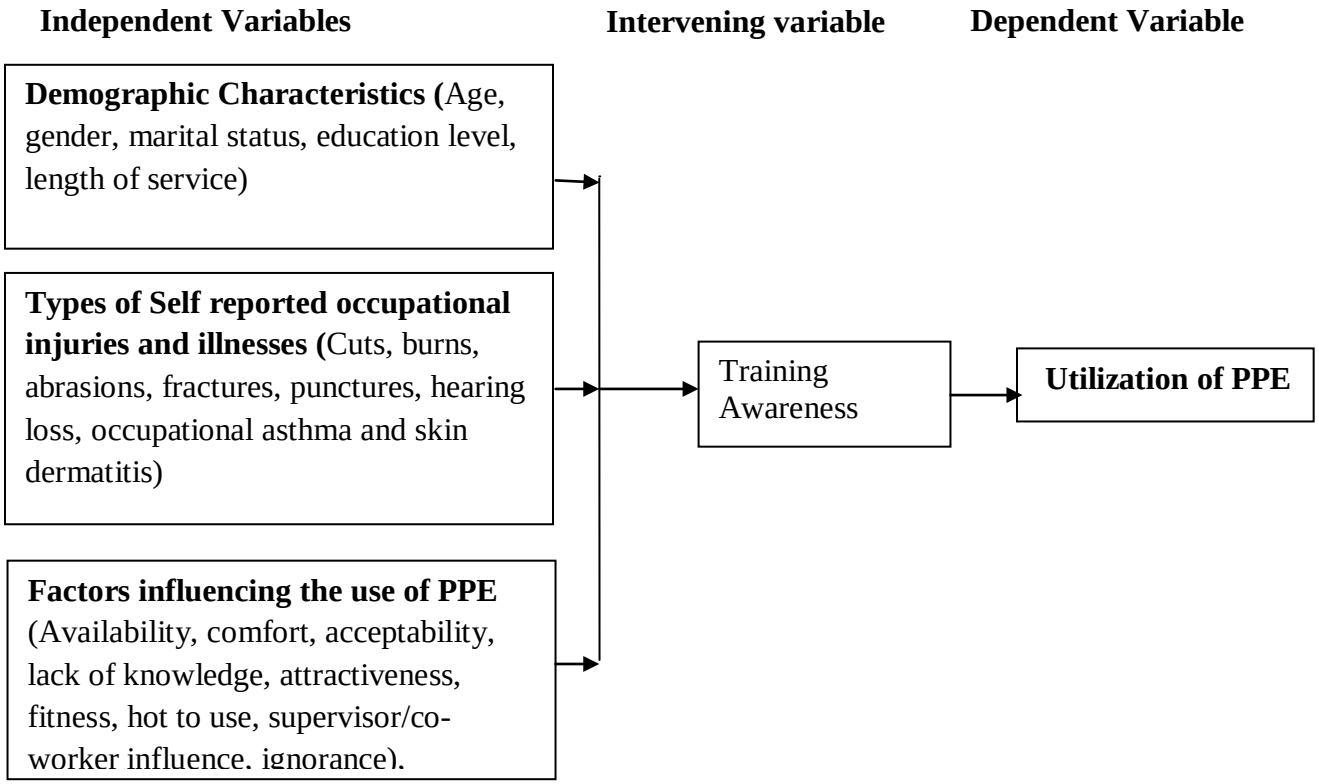
1.8.2 Delimitation

In this study, data collection tools triangulation between observations, self and researcher administered questionnaires were applied to enhance response rate, validity and reliability of the collected data. This helped to counter the above limitations and hence generalizations of this study findings. Both quantitative and qualitative data was also collected with more questionnaires administered for longer period than initially planned so as to yield the targeted responses.

1.9 Conceptual Framework

The study assessed the relationship between the independent variables, intervening variables and the dependent variable; the conceptual framework was adopted and modified from Truong et al. (2009). The independent variables were the Socio- Demographic Characteristics; Age, gender, marital status, education level and length of service, the common types of self reported occupational injuries and illnesses; cuts, burns, abrasions, fractures and punctures, and the factors influencing utilization of PPE; availability, acceptability, comfort, fitness, attractive, hot to use among others. Intervening variable explains how or why the independent variable affects the dependent variable. In this study training and awareness were expected to influence the relationship between the independent and dependent variables. The depended variable was Utilization of PPE as shown in figure 1.1 below.

Figure 1. 1: Conceptual Framework



Adopted and modified from Truong et al. (2009)

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter is about literature review for the study. It presents literature on food manufacturing industries, nature of PPE utilizations, factors influencing their utilization, and nature of occupational injuries.

2.2 Nature of Food Manufacturing Industries

According to Rais *et al.,* (2013), food manufacturers are the industries that transform livestock and agricultural products into products for intermediate or final consumption. Food manufacturing is the transformation of raw ingredients into food, or of food into other forms. It typically takes clean, harvested crops or butchered animal products and uses these to produce attractive, marketable and often long shelf-life food products.

The food industry is divided into the two broad segments: Primary Processed Food - Includes products such as fruits and vegetables, packed milk, unbranded edible oil, milled rice, flour, tea, coffee, pulses, spices, and salt, sold in packed or non-packed forms. Value-added Processed Food - Includes products such as processed fruits and vegetables, juices, jams, pickles, squashes, processed dairy products (ghee, cheese, and butter), processed poultry, and processed marine products, confectionary, chocolates, and alcoholic beverages. Across the world, food manufacturing leads to income generation but also helps in reduction of wastage, value addition, and foreign exchange earnings and enhancing manufacturing competitiveness. It involves a process production environment with hazardous risks and therefore should ensure safety and health of their workers at all times (Rais *et al.*, 2013).

2. 3 Nature of Personal Protective Equipment.

Personal Protective Equipment is designed to protect employees from serious workplace injuries or illnesses that are resulting from contact with chemical, radiological, physical, electrical, mechanical, or other workplace hazards. Personal Protective Equipment includes a variety of devices and garments such as face shields, safety glasses, hard hats, safety shoes, coveralls, gloves, earplugs and respirators (OSHA, 2009). While majority of work-related injuries are preventable, absence, inadequate or inappropriate use of PPE remains an important risk factor (Torp, 2005). The PPE equipment often used in the food industries include gloves, Slip-resistant safety boots, overalls, earplugs, helmets, goggles or face shields and disposal masks.

Gloves protect the individual from contact with irritants and allergens. They prevent cross infection for co-workers and the consumer. Slip-resistant safety boots are used to protect the workers from wet and slippery floors and conduct with repeated use of water and disinfectants. Overalls protect the workers from exposure to skin irritants, they are also worn to minimize body contamination and help to reduce body cooling by restricting the movement of air over the body and the evaporation of sweat. Earplugs are commonly used in flour mills and bottling plants where the noise level can be harmful. Goggle or face shields and respirators are normally worn by workers who mix hazardous chemical substances and dust in order-to prevent splashing and inhalation of the substances and dust. Safety helmets are used by workers who are responsible for stacking finished products ready for transportation/shipment. Those who operate and maintain moving or stationery machines also use helmets (HSE, 2012).

2.4 Occupational Safety and Health Acts

The European directives set minimum standards to protect workers. The most important is Directive 89/391/EEC of 12 June 1989 on the introduction of measures to encourage

improvements in the safety and health of workers at work that sets out the risk assessment process and a hierarchy of prevention measures that all employers are required to follow (EASH, 2011). In South Africa an Act of Parliament was passed in 1993, the Occupational Health & Safety Act (No. 85 of 1993). This legislation provided for more protection for employees as well as responsibilities of the employer to ensure that the workplace is safe and healthy. While it covers the roles and responsibilities of employers and employees, it also covers the roles and responsibilities of health and safety representatives (OHSC, 2009).

The history of OHS in Kenya dates back to 1948 with the introduction of the Factories Act. In 1987 this Act was amended to the Factories and Other Places of Work Act (FOPWA), to enlarge its scope. The Kenyan government has developed legislative measures such as; the OSHA of 2007 that demands employers to ensure protection of workers, and the WIBA of 2007 that directs the employers to take full responsibility in case of an accident at the workplace. However, research has shown that most workers in food manufacturing industries do not use PPE appropriately and consistently despite the eminent dangers in their work place (ILO, 2008).

2.5 Occupational Hazards

According to Smith and Keeler (2007), occupational hazard is a working condition that can lead to injury, illness or death. The industry employs many different types of workers and the hazards in these industries vary between the different industries. Some hazards are common for the whole industry while others are unique to a few sectors within the industry. A discussion on the common types of occupational hazards is as presented below.

2.5.1 Hazardous Substances

During the cleaning or maintenance of production machinery, workers may be exposed to hazardous substances such as disinfectants and lubricants (hot and cold fluids), and ammonia in

refrigeration systems. Lubricants, greases, oils and hydraulic fluids are needed to protect machinery and moving parts against wear and corrosion and to prevent high temperatures caused by friction. Lubricants may pose a health risk to workers involved in maintenance tasks. They can provoke allergic reactions such as dermatitis or breathing problems (Lind and Nenonen, 2008). Chemical food safety can also be affected by poor maintenance: e.g. contamination of food products with cleaner or sanitizer residue, contamination by maintenance tools, rusted metal containers, equipment or utensils or by foreign objects like glass or metal **(**Krol, 2009).

2.5.2 Biological Agents

Workers involved in maintenance may also come into contact with wastewater. Wastewater released from the food manufacturing industry contains among other substances organic matter such as starch, sugars and proteins, fats, oils, grease, and usually nutrients such as nitrogen (including ammonia) and phosphate. It can also contain biological agents, acids and lye, disinfectants and other chemicals (Müller and Tregenza, 2008).

2.5.3 Dust

In the grain industries explosions and fires can arise because of flammable dust and can have devastating and irreversible effects. Dust from flour, grain, custard powder, instant coffee, sugar, dried milk, potato powder and soup powder are examples of highly combustible dusts. A suitable ignition source, e.g. an electrical spark which may occur when pulling a plug out of a socket or a hot surface (e.g. 300°C to 600°C) may cause an explosion. Dust can also cause respiratory problems such as occupational asthma as well as irritations of eyes, nose and skin (HSE, 2008).

2.5.4 Machinery Related Accidents

Workers may be injured by machinery as a result of insufficient or bad maintenance or while maintaining machines without use of PPE. Typical accidents with machinery include: Being hit

or getting caught by moving parts of a machine, getting trapped between moving parts of a machine, lastly being hit by material or parts which have been thrown out of the machine (HSE, 2009).

2.5.5 Confined Spaces

Maintenance workers in the grain manufacturing industries may need to enter confined spaces such as storage tanks, vats, fermentation vessels, grape presses and crushers and similar equipment to carry out maintenance, inspection, cleaning and repair. Working in confined space can be very dangerous if one is not using the correct PPE: Dangers can arise because of lack of oxygen, toxic gases, liquids and solids that can suddenly fill the space (engulfment) as well as dust (e.g. flour silos) and hot or cold conditions. Lastly Poor visibility increases the risk of accidents in confined spaces and this can be prevented by ensuring safe working environment for all the workers at all the times (HSE, 2006) .

2.5.6 Slips, Trips and Falls

Slips, trips and falls are the main causes of accidents in the food industry. Slip injuries in particular happen more often in this industry than in most other industries, mostly due to wet or greasy floors contaminated e.g. with food, water and cleaning materials if workers do not use PPE appropriately they are prone to getting more injuries (HSE, 2009).

2.5.7 Physically Demanding Work

Workers involved in maintenance are at risk of developing musculoskeletal diseases, because frequently they have to work in awkward positions when maintaining machines that are difficult to access or enter confined spaces and if they are not wearing the correct PPE, they are prone to getting injuries (Procter, 2007).

2.5.8 Psychosocial Risk Factors

Workers often work under time pressure, at unsocial hours (no shift work), without sufficient instructions, in uncomfortable conditions, and in case of outsourced maintenance sometimes in unfamiliar work environments. Under these working conditions maintenance workers may suffer from work-related stress and fatigue which can result to injuries and this can be prevented by working in shift and giving the workers the right information about the conditions of the equipments (HSE, 2007).

2.6 Factors influencing use of PPE.

This is a great concern globally and several studies have sought to answer why PPE compliance remains low, even in settings where PPE is available, and the use and benefits of PPE are known. The reasons for this in order of importance or most frequently cited were discomfort while using PPE; fogging; individuals had no knowledge of hazard; did not think it was necessary for the task; perceived reduced risk if the task is brief; PPE not easily accessible from site of work; lack of coworker/supervisor influence; too hot; poor fit; unattractive and unavailability of PPE (Lombardi *et al*., 2009).

2.7 Types of Occupational Injuries and Illnesses

An occupational injury is any physical injury condition sustained on a worker in connection with the performance of his or her work in the industry (Antonio *et al.,* 2007). According to a study done by the Department of Environmental Health in the Ministry of Health in Ethiopia these injuries include; abrasions, cuts, burns, puncture and fractures. The same study listed fingers, hands, lower legs and eyes, as the most commonly affected parts of the body (MOH, 2008). Occupational allergies and asthma are illnesses resulting from hypersensitivity of the immune system to food substances encountered at the workplace. Further the study indicates that

worldwide the most common reported causes of occupational asthma in workplace are agents of biological origin such as cereal flours, enzymes and rubber latex (Jeebhy, 2005).

2.8 The Hierarchy of Hazard Control

According to Megan (2004), this is a list of control options that have been placed in a preferred order. It addresses the mechanisms for exposure reduction with an alternative categorization scheme as follows:

2.8.1 Elimination

While elimination is accepted as the best option for controlling exposure, it also can be the most impractical. An organization may not be able to eliminate a substance or process without compromising its entire production or the viability of the company. Historically, elimination of the hazard has involved the closure of industries. Some examples include: production of matches with white phosphorous was ceased and replaced with red phosphorous this was due to necrosis of the jaw (‘phossy-jaw’) in unprotected workers, the gradual reduction of production of leaded fuel and reduction in the use of lead-based paints (Megan, 2004).

2.8.2 Substitution

Where the hazard cannot be totally removed, the second preferred option considers an alternative process or material. Substitution often involves a substantial amount of trial-and-error to determine whether the alternative substance or technique is as efficient as the previous. Some examples of substituted hazards include: vegetable oil-based inks such as soya-bean oil instead of chemical inks in news printing presses, metal slag instead of silica sand for abrasive blasting, oil as opposed to mercury in barometers and gauges and replacing carbon tetrachloride and other solvents with trichloroethane (which in turn is being phased out because of its ozone depleting

characteristics). Processes can also be altered to minimize the probability of exposure. These include: transporting toxic substances such as cyanide as solid briquettes rather than as powders, dusts or liquid wet sweeping of lead dust on the floor of a shooting gallery rather than dry sweeping or air-jet blowing, substituting high-velocity processes for those of a lower velocity. (Megan, 2004).

2.8.3 Engineering Controls

This involves physically altering the path of transmission of the hazard or isolates the worker from the agent. The three alternatives are: segregation or isolation; guarding and signage; and ventilation (Megan, 2004).

2.8.4 Administrative Controls

Concentrate on the worker rather than the workplace. Some examples of these controls are: worker rotation and job placement, education and training, good housekeeping and hygiene, maintenance, scheduling of work, monitoring and health surveillance which can help minimize/ reduce injuries (Megan, 2004).

2.8.5 Personal Protective Equipment

Personal protective equipment is the final barrier against occupational hygiene hazards. It includes items such as: respirators, gloves, overalls and aprons, boots, glasses, goggles and shields and hearing protection devices e.g. earmuffs, earplugs, helmets. These equipments help to prevent injuries and illnesses if they are used appropriately and consistently. Employers should provide PPE to all employees and ensure a safe working environment all the time to ensure safety of the worker (Megan, 2004).

CHAPTER THREE: MATERIALS AND METHODS

3.1 Introduction

This chapter highlights the materials and methods used in conducting this study. First, the section discusses the study design, location of the study, target population, sampling technique and sample size determination. It then narrowed down to the research instruments, ethical consideration and data analysis methods used.

3.2 Research Design

The study was cross-sectional and descriptive by nature. According to Saunders *et al*., (2007), a cross-sectional descriptive study is ideal in situations where the aim is to provide a point in time information that captures the opinions, attitudes, preferences, prevalence and factors of interest in research. The design was therefore deemed appropriate for this study since the study aimed at assessing utilization of PPE among workers in grain and oil seed milling industries in Nairobi City County, Kenya.

3.3 Variables

The independent variables were the social demographic characteristics, common types of self reported occupational injuries and illnesses, the level of use of PPE and the factors influencing the use of PPE, the intervening variables were training and awareness. The dependent variable was utilization of PPE.

3.4 Location of the Study

The study was carried out in the industrial geographical areas of Nairobi City County which is the commercial hub of the country housing many of the grain and oil seed industries situated in latitude 1.283S, longitude 36.81E (Appendix IV).

3.5 Target Population

The target population included all workers in grain and oil seed milling industries within the Nairobi City County geographical area which according to Kenya Association of Manufacturers (KAM) report (2009) was estimated to be 4598. The study population included 684 workers of the three selected grain and oilseed milling industries.

3.6 Sampling Techniques and Sample Size

3.6.1 Sampling Techniques

Nairobi City County was purposively selected due to its status and being the industrial hub of the republic of Kenya. Simple random sampling technique was then used to select the three industries out of the nine industries that deal with grain and oilseed milling in Nairobi City County. The respondents were also selected through simple random sampling but only from those who met the inclusion criteria until arriving at the sample of 342 respondents by picking 50% of respondents proportionally to the number of workers from each of the selected industry.

3.6.2 Sample Size Determination

The sample size was determined using Fisher's *et al.*, (1998) formula where:

$$n=\frac{z^2pq}{d^2}$$

Where:

n=desired sample size (when target population is greater than 10,000)

z = standard normal deviation at 95% confidence level. (1.96)

p= the proportion of the target population estimated to have a particular characteristic being measured (0.6)

q= 1-p (0.4)

d = the level of statistical significance. (0.05)

Prevalence of non use of PPE 60%, (Taha, 2010)

$n=\frac{1.96*1.96*0.6*0.4}{0.05*0.05}$ = 368.7936 approximately 369

For population less than 10,000

Adjusted sample (nf) = $\frac{n}{1+n/N}$

Where n= 369

N= 4598 (KAM, 2009)

nf = $\frac{369}{1+369/4598}$ = 341.586873 approximately 342

Table 3. 1: Sampling Frame

Food Industry	**Population**	**Sample Size (50%)**
Gachanja Muhoro and Sons millers	222	111
Premier flour mills	200	100
Unga Group limited	262	131
Total sample size		**342**

3.7 Pre-Testing

In this study, a pre-test was done using 34 respondents (10%), from Pembe flour mills ltd. Its purpose was to test if the proposed study was feasible and whether the study instruments were adequate in the allocation of the required data. Through this exercise, only questionnaires and observation checklist emerged to be feasible data collection tools for workers in grain and oil seed milling industries and hence improved for administration.

3.8 Validity and Reliability

3.8.1 Validity

Validity represents how well a research tool measures what it is supposed to measure and it is considered as being more important because the objectives of the study must be representative of what the researcher is investigating (Welman et al., 2005). It is concerned with whether a research instrument is measuring what is intended .In this study, validity was achieved through adoption of research instruments developed and applied in previous other related studies (Kothari, 2004). Sampling validity was ensured through careful statement of research objectives and research questions. Constructs validity was ensured through operationalization of variables, concepts and terms to reflect the theoretical assumptions that underpin the conceptual framework of the study.

3.8.2 Reliability

This is a measure of the degree to which a research instrument yields consistent results or data after repeated trials. Reliability refers to the fact that if different research participants were asked to complete the same questionnaire at different times, it should confirm the initial responses to the instrument (Welman, et al., 2005). The traditional two methods of testing the reliability of research instruments were used in this study. Tests for equivalence (consistency of the results by different investigators or similar tests at the same time) and Internal consistency (the measurement of the concept is consistent in all parts of the test).Test of equivalence was ensured through questionnaire pretesting with 34 participants from Pembe Flour Mills to check appropriateness of the questionnaire and to identify unclearly formulated items. It was also ensured by using well designed questionnaires, proper selection of the subjects, training and close supervision of the research assistants and through daily monitoring and correction of the

filled questionnaires. Those workers who participated in the pre-test study were not included in the research project. Internal consistency was measured through the Coefficient Alpha. Literature indicated that appropriate reliability should be equal to or higher than 0.60 (Kothari, 2004) hence was the standard cut off point for this study.

3.9 Data Collection Instruments

Both self and researcher administered questionnaires procedures were used to collect data with the help of two trained research assistants. The questionnaires had both open-ended and closed-ended questions. Observations checklist was also employed to collect data. The data collection period took place between April and July 2015.

3.10 Recruitment Criteria

3.10.1 Inclusion Criteria

In order to be eligible to participate in the study, individuals were to first consent to be willing to participate in the research. They also had to be workers in the selected industries who draw salaries/wages and have been on the payroll for at least three months or more prior to the date of research.

3.10.2 Exclusion Criteria

Individuals were excluded from the study if they failed to consent, those who were absent, on leave and night duty during the study period. Those who had worked for less than three months and also those involved in safety committees because they would introduce some biases.

3.11 Logistical and Ethical Considerations

Approval to conduct the research was obtained from Kenyatta University Graduate School. Ethical clearance to carry out the research was sought from Kenyatta University Ethics and

Review Committee (KU- ERC, Appendix V), permit to carry out the study was sought from National Commission for Science, technology, and innovation (NACOSTI, Appendix VI). Informed consent was obtained from all participants and confidentiality of the information collected was assured.

3.12 Data Analysis

Analysis of data was done using Statistical Package for Social Sciences (SPSS) version 20 and it entailed frequencies and cross-tabulation tables with Chi-square tests of significance at 5 % level. The results were then presented in form of graphs, tables and figures. Other qualitative data was analysed using content analysis that was based on key themes from the study objectives and also from the observation.

CHAPTER FOUR: RESULTS

4.1 Introduction

This chapter presents data analysis and the results of the study. The first part involves the socio-demographic characteristics of the respondents while the second part presents results on the utilization of PPE among workers in grain and oil seed milling industries in Nairobi City County, Kenya.

4.2 Preliminary Information

4.2.1 Response Rate

The response rate for the study was within the recommended levels. In the end, 342 questionnaires were returned for the dependent variable question. However, the response rate varied from the dependent variable's 100% (342) to at least 45% (154) for the rest of the variables. According to Kothari (2004) a 50% response rate is adequate, 60% good and above 70% very good.

4.2.2 Reliability

Kothari (2004) recommends that appropriate reliability should be equal to or higher than 0.60 hence the test for this study ensured that all the factors scored above the 0.60 Cronbach's Alpha cut off as shown in table 4.1 below. This showed that the study instrument was reliable.

Table 4.1 Reliability Test Results

Factor Dimension	Cronbach's Alpha
Social demographic characteristics	.718
Types of self reported occupational injuries and illnesses	.867
Factors influencing utilization of PPE	.745
Utilization of PPE	.834

From the above outcomes of reliability testing, the four variables qualified for further analyses.

4.3 Socio-demographic Characteristics of the Respondents

The study was carried out among 342 workers from the selected grain and oil seed milling industries in Nairobi City County. This section presents respondents social demographic characteristics, their attributes of age, gender, marital status, level of education and length of service are as shown in table 4.2.

Table 4. 2: Socio-demographic Characteristics of the Respondents

Variable	Category	Frequency (n)	Percent (%)
Age in years	18 - 35 years	**205**	**59.9**
	35 - 50 years	137	40.1
Gender	Male	**196**	**57.4**
	Female	146	42.6
Marital status	Married	**249**	**72.9**
	Single	93	27.1
Highest level of education	Primary school	62	18.0
	Secondary school	**124**	**36.3**
	Technical college	94	27.4
	Technical college Diploma	53	15.5
	University Degree	9	2.8
Length of service	3 Months - 6 years	**242**	**70.7**
	Above 6 years	100	29.3
Total		**342**	**100**

The overall mean age for the study participant was ±25 years. Majority of the workers were aged below 35 years (59.9%, n=205). They were also dominantly of male gender (57.4%, n=196) and married (72.9%, n=249). However, they were dominated by high school (36.3%, n=124) and tertiary (42.9%, n=147) certificate education levels. The degree certificate holders (2.8%) were the minority. In terms of working experience, the findings showed that majority of the workers (70.7%, n=242) had worked for at least 6 years with only a few (29.3%, n=100) having worked beyond that.

4.4 Common Types of Self-Reported Occupational Injuries and Illnesses among the Workers

The study sought to identify the common occupational injuries and illnesses experienced by the workers in their working environments.

4.4.1 Types of Self Reported Occupational Injuries

Majority (54.9%, n=185) of the study respondents reported not to have suffered any form of injuries as shown in (Table 4.3) below. The workers were asked to state the kind of injuries they had experienced for the last one year prior to data collection. The responses were cross tabulated for comparisons with PPE use and the types of injuries suffered, workers' age, gender and length of service in the industry.

Table 4. 3: Relationship between Types of Injuries and Use of PPE by the Respondents

Characteristic Percentage of Respondent; N=317			
Injuries suffered	**Yes**	**No**	**Significance**
Abrasions			
Yes	37(32.2%)	78 (67.8%)	x^2=7.446, df=1, p=.029
No	106(52.5%)	96(47.5%)	
Total	**143(45.1%)**	**174(54.9%)**	
Cuts			
Yes	58(40.3%)	86(59.7%)	x^2 =17.603, df=1 p<.001
No	85(59.4%)	58(40.6%)	
Total	**143(45.1%)**	**174(54.9%)**	
Burns			
Yes	7(35.0%)	13(65.0%)	x^2=12.752, df=1, p<.001
No	136(45.8%)	161(54.2%)	
Total	**143(45.1%)**	**174(54.9%)**	
Fractures			
Yes	18(31.6%)	39(68.4%)	x^2=13.452, df=1, p<.001
No	125(48.1%)	135(51.9%)	
Total	**143(45.1%)**	**174(54.9%)**	
Punctures			
Yes	6(42.9%)	8(57.1%)	x^2=.962, df=1, p=.388
No	137(45.2%)	166(54.8%)	
Total	**143(45.1%)**	**174(54.9%)**	

The above results showed that having suffered abrasions, cuts, burns and fractures had a significant association with use of PPE. However, suffering punctures was not significantly associated with use of PPE. Majority (59.7%, n=86) of the respondents who had suffered cuts were not using PPE at the time of the study. Similarly majority (65.0%, n=13) of the respondents who had suffered burns were not using PPE at the time of the study. This confirms that there was an association between injuries suffered and PPE utilization. However in only one case (punctures), the relationship was not significant (x^2=.962, df=1, p=.388) .

The study further sought to compare the relationship between having suffered various types of injuries and socio demographic characteristics of the respondents and the results are presented in table 4.4 to 4.8 below.

Table 4. 4: Relationship between having Suffered Abrasions and Social Demographics

Characteristic percentage of the respondents; N=166			
Age group	**Yes**	**No**	**Significance**
18 - 35 years	38(32.7%)	78 (61.3%)	x^2=12.9, df=2, p=.002
35 - 50 years	14(28.0%)	36(72.0%)	
Total	**52(31.2%)**	**114(68.8%)**	
Gender			
Female	13(25.2%)	38(74.8%)	x^2 =17.603, df=1 p<.001
Male	39(34.3%)	76(65.7%)	
Total	**52(31.2%)**	**114(68.8)**	
Length of service			
3months - 6 years	45(34.8%)	84(65.2%)	x^2=16.56, df=2, p<.001
Above 6 years	7(19.0%)	30(81.0%)	
Total	**52(31.2%)**	**114(68.8%)**	

From the results above majority of the workers (68.8%, n=114) did not suffer any abrasions. Abrasions were significantly associated with among workers below 35 years (32.7%, n=38) at (x^2=12.9, df=2, p=.002) at 5% confidence level. Also the findings further indicate significantly

higher number of male workers had suffered abrasions (34.3%, n=39) as compared to the female workers (25.2%, n=13) at (x^2=17.603, df=1 p<.001). Similarly workers with over 6 years of experience had suffered less abrasions (19.0%, n=7) as compared to the younger workers (n=45, 34.8%) and the relationship was also significant (x^2=16.56, df=2, p<.001).

Table 4. 5: Relationship between having suffered Cuts and Social Demographics characteristics

Characteristic percentage of respondents; N=166			
Age group	**Yes**	**No**	**Significance**
18 - 35 years	52(46.8%)	59(53.2%)	x^2=10.9, df=2,p=.004
35 - 50 years	15(27.3%)	40(72.7%)	
Total	**67(40.3%)**	**99(59.7%)**	
Gender			
Female	16(31.5%)	35(68.5%)	x^2=11.925, df=1, <.001
Male	51(44.6%)	64(55.4%)	
Total	**67(40.3%)**	**99(59.7%)**	
Length of service			
Below 6 years	57(44.6%)	72(55.4%)	x^2=9.725, df=2, p.008
Above 6 years	10(26.4%)	27(73.6%)	
Total	**67(40.3%)**	**99(59.7%)**	

Majority of the workers (59.7%, n=99) did not suffer any cuts. The results further showed that workers below 35 years of age had suffered more cuts (46.8%, n=52) as compared to the older workers (27.3%, n=15) and the relationship between the cuts suffered and age was significant (x^2=10.9, df=2, p=.004). A higher proportion of males (44.6%, n= 51) had suffered more cuts as compared to their female counterparts (n=16, 31.5%) and the relationship between the cuts suffered and the gender was significant (x^2=11.925, df=1, p<.001). A lower percentage of workers with over 6 years of experience had suffered cuts (26.4%, n=10) as compared to those experienced below six years (n=57, 44.6%) and the relationship was significant (x^2=9.725, df=2, p.008).

Table 4. 6: Relationship between having Suffered Burns and Social Demographics

Characteristic percentage of respondents; N=1 66			
	Yes	**No**	**Significance**
Age group			
18 - 35 years	9(8.2%)	101(91.8%)	x^2=1.8, df=2, p=.407
35 - 50 years	2(3.6%)	54(96.4%)	
Total	**11(6.6%)**	**155(93.4%)**	
Gender			
Female	3(6.0%)	48(93.4%)	x^2=.912, df=1, p=.339
Male	8(6.4%)	107(94.0%)	
Total	**11(6.6%)**	**155(93.4%)**	
Length of service			
Below 6 years	9(7.0%)	120(93.0%)	x^2=1.2, df=2, p=.588
Above 6 years	2(5.0%)	35(95.0%)	
Total	**11(6.6%)**	**155(93.4%)**	

From the results above majority of the workers (93.4%, n=155) did not suffer any burns. However, further interrogations to the results show that a higher number of those below 35 years of age had suffered more burns (8.2%, n=9) as compared to those above 35 years old workers (3.6%, n=2). However, the relationships between burns suffered and age was not significant (x^2=1.8, df=2, p=.407). Male workers (6.4%, n=8) had suffered more burns as compared to the female workers (6.0%, n=6) but the relationship between burns suffered and gender of the workers was not significant (x^2=.912, df=1, p=.3396). Similarly those with over 6 years of experience had suffered less burns as compared to the younger workers but this relationship was also not significant (x^2=1.2, df=2, p=.588).

Table 4. 7: Relationship between having Suffered Fractures and Social Demographics

Characteristic percentage of respondents; N=166			
Age group	**Yes**	**No**	**Significance**
18 - 35 years	20(26.1%)	85(73.9%)	x^2=11.998, df=2, p=.003
35 - 50 years	18(29.5%)	43(70.5%)	
Total	**38(22.8%)**	**128(77.2%)**	
Gender			
Female	7(13.9%)	44(86.1%)	x^2=15.9, df=1, p<.001
Male	31(27.1%)	84(72.9%)	
Total	**38(22.8%)**	**128(77.2%)**	
Length of service			
Below 6 years	28(22.0%)	99(78.0%)	x^2=1.3, df=2, p=.522
Above 6 years	10(15.6%)	54(84.4%)	
Total	**38(22.8%)**	**128(77.2%)**	

Majority of the workers (77.2%, n=128) did not suffer any fractures. However, workers below 35 years of age had suffered more fractures (26.0%, n=30) as compared to the older workers (29.5%, n=18) and relationship between fractures suffered and age was significant (11.998, df=2, p=.003). Males (27.1%, n=31) also workers had suffered more fractures as compared to the female workers (13.9%, n=7) and the relationship between fractures suffered and the gender of the workers was highly significant (x^2=15.9, df=1, p<.001). The results further showed that those who had served below 6 years had suffered more fractures (22.0%, n=28) as compared to those who had worked for longer time. However this relationship between fracture suffered and years of experience was not significant (x^2=1.3, df=2, p=.522).

Table 4. 8: Relationship between having Suffered Punctures and Social Demographics

Characteristic percentage of respondents; Punctures N=166			
Age group	**Yes**	**No**	**Significance**
18 - 35 years	10(8.4%)	109(91.6%)	x^2=1.8, df=2, p=.407
35 - 50 years	2(4.3%)	45(95.7%)	
Total	**12(7.3%)**	**154(92.7%)**	
Gender			
Female	3(5.7%)	48(94.3%)	x^2=2.2, df=1, p=.138
Male	9(8.2%)	106(91.8%)	
Total	**12(7.3%)**	**154(91.8%)**	
Length of service			
Below 6	8(6.8%)	109(93.2%)	x^2=1.4, df=2, p=.497
Above 6	4(6.3%)	45(93.8%)	
Total	**12(7.3%)**	**154(91.8%)**	

Majority of the workers (92.7%, n=154) did not suffer any punctures. However, those below 35 years of age suffered more punctures (8.4%, n=10) as compared to the older workers but this relationship was not significant (x^2=1.8, df=2, p=.407). Male workers (8.2%, n=9) had suffered more punctures as compared to the female workers (5.7%, n=3) but also the relationship between punctures suffered and gender was not significant (x^2=2.2, df=1, p=.138). Workers with over 6 years of experience had suffered less punctures as compared to the younger workers but the relationship between punctures suffered and years of experience was not significant (x^2=1.4, df=2, p=.497).

4.4.2 Body Parts Affected by Occupational Injuries

The International Classification of Diseases (ICD) classifies body parts affected by injuries into six parts namely, head, arm, legs, back, neck and chest. The study sought to determine the parts of the body that are affected by injuries and the results were presented in (figure 4.1).

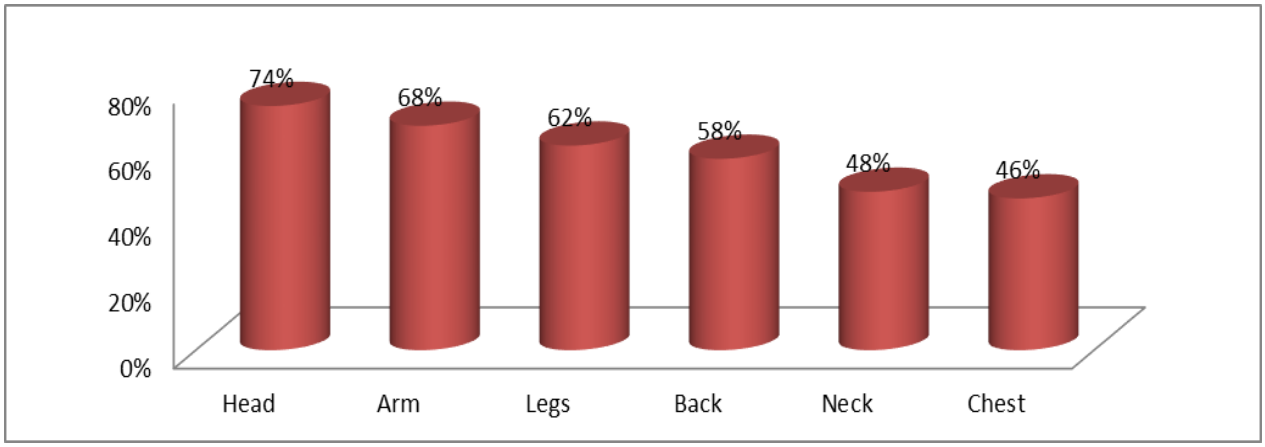


Figure 4. 1: Body Parts Affected by Injuries

Majority of the workers rated head as the most affected body part with a score of (74%, n=253). This was followed by arms and legs both at 68% (n=233) and 62% (n=212) respectively with the least affected body part being the chest at 46% (n=157). Majority of the workers who have suffered head injuries said they usually do not see the need to put on head gears because they make them feel uncomfortable and are usually hot to wear.

4.4.3 Types of Occupational Illnesses among the Workers

Occupational allergies and asthma are illnesses resulting from hypersensitivity of the immune system to food substances encountered at the workplace. The study sought to find out the types of occupational illness suffered by the workers in these industries and the results presented in figure 4.2.

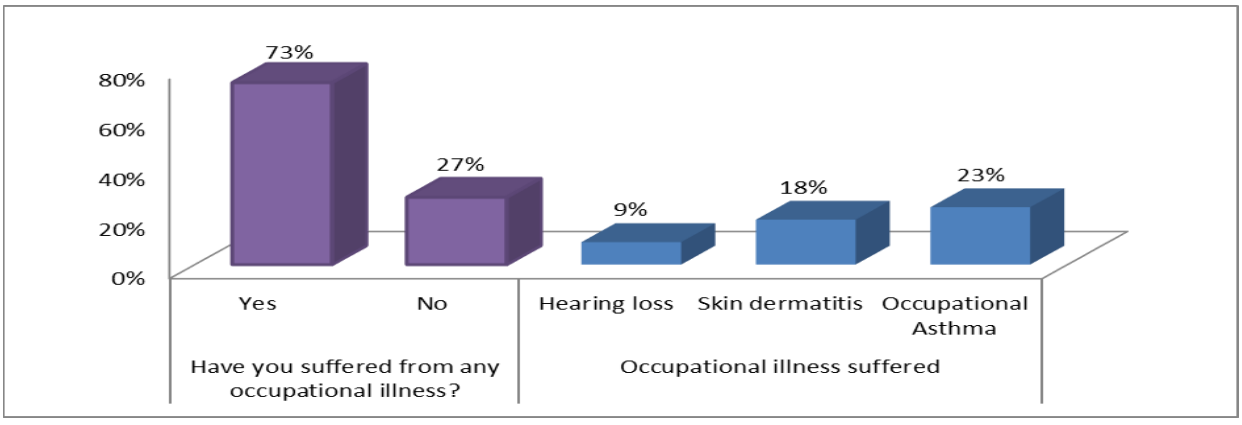


Figure 4. 2: Occupational Illness

Seventy three percent (n=249) of the workers indicated to have suffered occupational illnesses. This was confirmed after they sought treatment when they became ill and that is how they became aware of their infection status. The most common occupational illnesses cited by the workers were occupational asthma at (23% n=58), Skin dermatitis (18% n=45) mostly as a result of inhalation and coming into contact with flour dust from the grains during the time of milling. Respectively the least cited illness was hearing loss at (9% n=23) caused by loud noise produced by the milling machines.

4.4.4 Causes of Injuries and Illness Suffered by the Workers

Respondents were asked to state the various causes of injuries and illnesses and the results were presented in Figure 4.3

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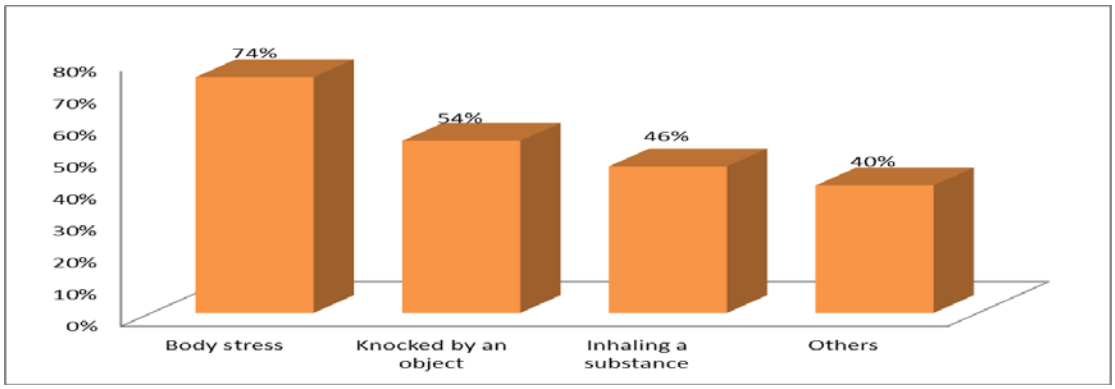

Figure 4. 3: Perceived Causes of Injuries and Illnesses

The most cited cause of injury was body stress (74% n=253), knocked by an object (54%, n=185) while inhaling a substance was the least stated. Majority of the workers said that body stress was the main cause of injuries because they work for long hours and sometimes in uncomfortable position and this brings a lot of fatigue. Inhaling a substance (flour dust) was found to be the main cause of occupational asthma among the respondents. Others said they sometimes do not see the need to put on PPE and this exposes them to the injuries and illnesses.

4.4.5 State of First Aid kits in the Industries

A first aid kit is a collection of supplies and equipment for use in giving first aid, and can be put together for the purpose by an individual or organization. The study sought to establish the presence of first aid kits in the sampled industries and found out that the first aid kits in Premier Flour Mills and Unga Group Limited were well equipped as compared to that in Gachanja Muhoro and Sons Millers.

4.4.6 Persons who assist the Workers after Suffering Injuries

Respondents were asked to state how they got help after getting injury in line of duty and the responses are as shown in figure 4.4.

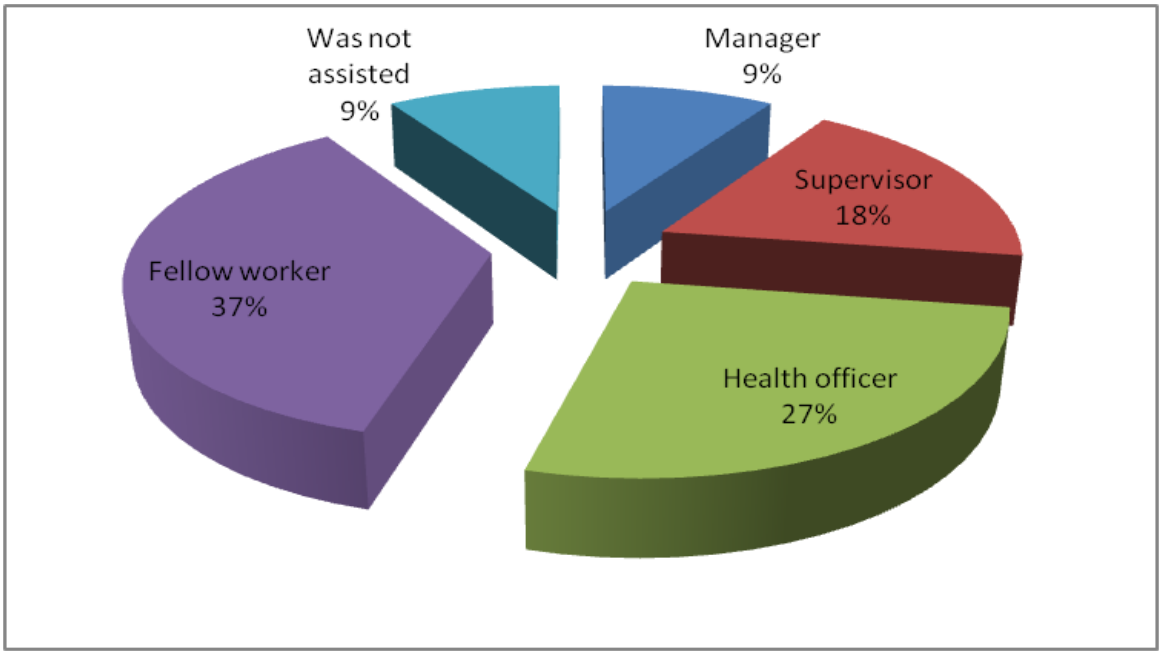

Figure 4. 4: Persons who Assisted the Workers after Suffering Injuries

Majority (37%, n=93) of the respondents were assisted by fellow workers, those that were assisted by health workers were (27%, n=68) while those that were not assisted at all tied with those assisted by the managers at (9%, n=23).

4.4.7 Measures Taken after the Workers are Injured

To assess the measures taken after injury, respondents were asked to rate the extent each of the measures given was applied to them and the results were presented in Figure 4.5.

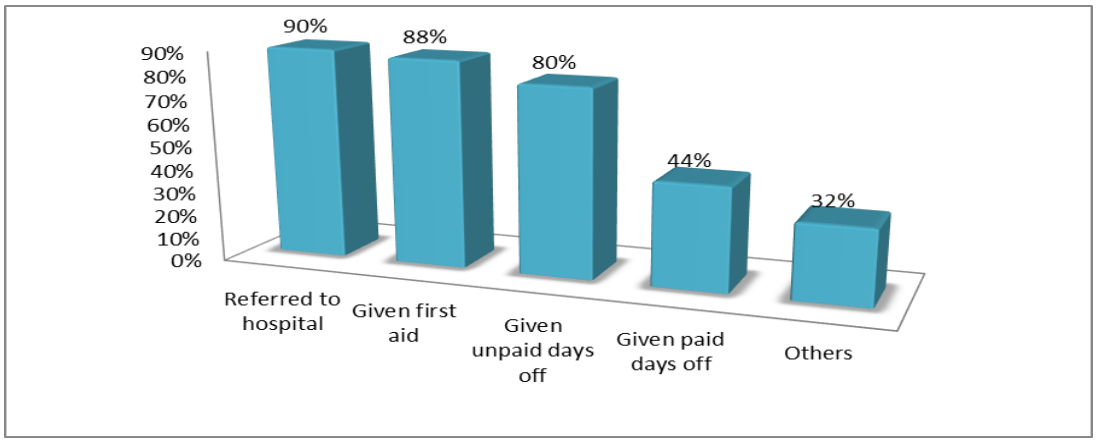

Figure 4. 5: Measures Taken after Suffering from Injuries and Illnesses

Being referred to hospital was rated the highest (90%, n=308), followed by first aid at (88%, n=301) and a significant number (80%, n=274) given unpaid days off from duty while the minority are given paid off days at 44% (150). The study further found out that majority of the workers who got injured are given unpaid days off until they recover and are able to resume work again.

4.5 The Level of Use of PPE among the workers

4.5.1 Utilization of PPE and its Relationship with the Socio Demographic Characteristics

Use of PPE effectively and consistently helps to prevent occupational injuries and illnesses. The researcher observed use of PPE among the sampled respondents and the results were presented in table 4.9.

Table 4. 9: Relationship between Use of PPE and Socio Demographic Characteristics

Characteristic percentage of respondents ;N =342)			
Age group	Yes	No	
18 - 35 years	99(39.0%)	155(61.0%)	x^2=9.9, df=2, p=.007
35 - 50 years	55(62.5%)	33(37.5%)	
Total	**154(45.1%)**	**188(54.9%)**	
Gender			
Female	51(34.8%)	95(65.2%)	x^2=10.23, df=1, p=.002
Male	103(52.5%)	93(47.5%)	
Total	**154(45.1%)**	**188(54.9%)**	
Length of service			
3 months – 6 years	82(37.3%)	138(62.7%)	x^2=21.725, df=2, p<.001
Above 6 years	72(58.5%)	51(41.5%)	
Total	**154(45.1%)**	**188(54.9%)**	

The study found out that majority of the workers were not using PPE (54.9%, n=188). Further interrogation to the data showed that majority of those below 35 years of age (61.0%, n=155) were not using PPE compared to those above 35 years of age and the relationship between use of PPE and age was significant (x^2=9.9, df=2, n=342, p=.007). Similarly, the study found out that majority of the female workers (65.2%, n=95) were not using the PPE as compared to the male workers (47.5%, n=93) and the relationship between PPE utilization and gender was significant (x^2=10.23, df=1, n=342, p=.002). Majority of workers with less than 6years of experience (62.7%, n=138) were not using PPE as compared to those with more work experience (41.5%, n=51) and the relationship between PPE usage and work experience was highly significant (x^2=21.725, df=2, n=342, p<.001).

4.5.2 Training Strategies to Enhance Use of PPE

To assess the training strategies that are used to enhance the level of use of PPE among the workers, respondents were asked to state how they mainly acquired the skills they are using in their industries and the results were presented in figure 4.6.

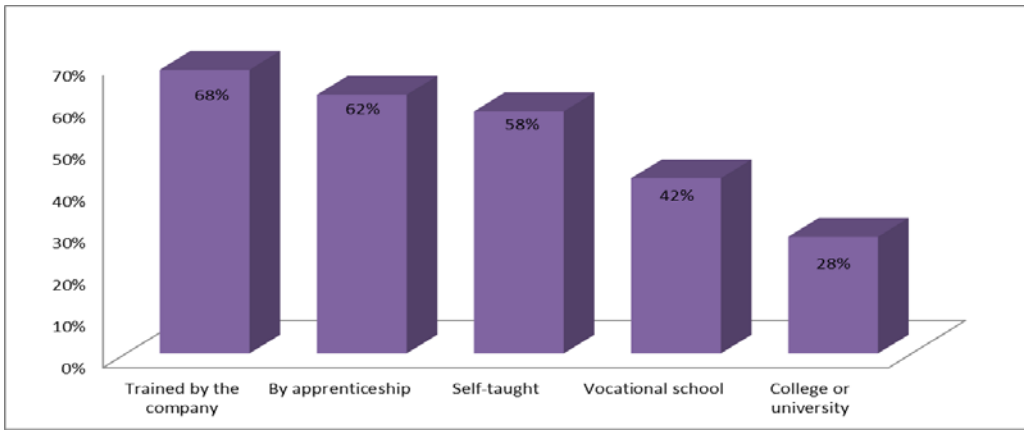

Figure 4. 6: Training Strategies to enhance use of PPE

On-job training was rated highest at (68%, n=233) followed by apprenticeship at (62% n=212) with college/university being rated lowest at (28%, n=96). From the study results, majority of the workers 68% (n=233) once recruited are taken through some form of training where they acquire their working skills. At the same time they are taught on the importance of using PPE to prevent occupational injuries and illnesses. Others learn by practical experience 58% (n=198) with the minority being college/ university graduates.

4.5.3 Types of PPE used by Workers in Preventing Injuries and Illness

There are various types of PPE that are used to prevent injuries and illness, these include dust masks, gloves and overall among others. When asked about the various types of PPE they use to protect themselves, the responses are shown in figure 4.7.

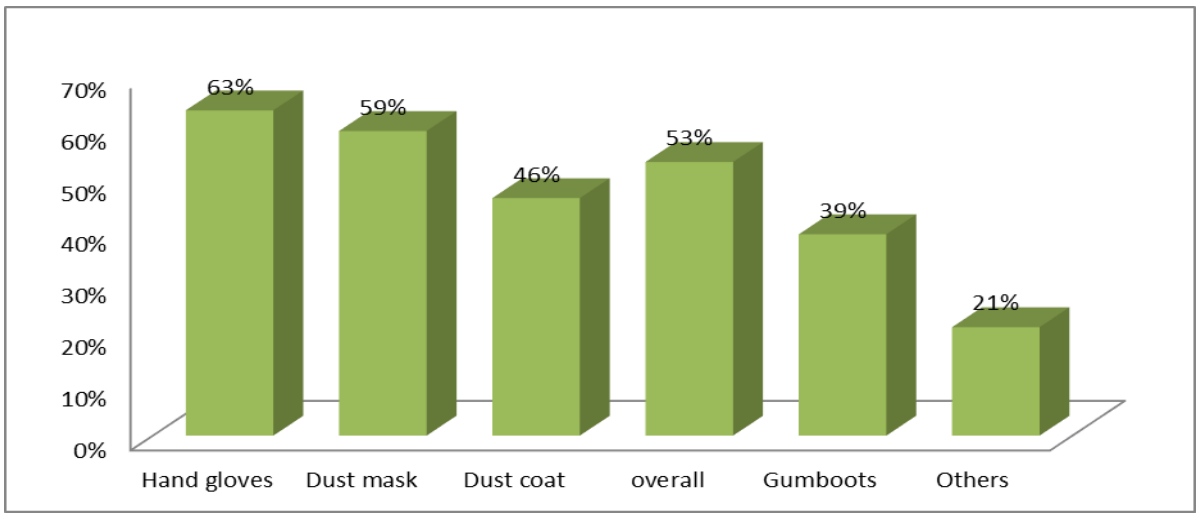

Figure 4. 7: Types of PPE Used by the Workers

A large proportion of the workers 63% (n=216) reported that they were using hand gloves more than the others types of PPE and only 39% (n=133) were using gumboots. Similarly a small percentage 21% of respondents was not using helmet, goggles and ear plugs. The observed conditions of PPE use were compared with the worker's age, gender and length of service in the industry as discussed below.

Relationship between the Conditions of PPE used and Socio Demographic Characteristic of the Respondents

The study further cross tabulated the conditions of used PPE and socio demographic characteristics of the respondents and the results were presented below.

Table 4. 10: Relationship between PPE Appropriate for the Task Performed and Socio Demographics

PPE appropriate for the task performed; N=154			
Age group	Yes	No	
18 - 35 years	85(78.0%)	24(22.0%)	x^2=11.420, df=2, p<.001
35 - 50 years	39(86.7%)	6(13.3%)	
Total	**124(80.6%)**	**30(19.4%)**	
Gender			
Female	86(85.0%)	6(15.0%)	x^2=6.603, df=1, p=.048
Male	35(76.1%)	27(23.9%)	
Total	**121(80.6%)**	**33(19.4%)**	
Length of service			
3 months – 6 years	88(77.2%)	26(22.8%)	x^2=16.600, df=2, p<.001
Above 6 years	33(82.5%)	7(17.5%)	
Total	**121(80.6%)**	**33(19.4%)**	

The study generally found that available PPE were appropriate for the tasks performed (80.6%, n=124). Further the results showed that majority of workers above 35 years of age wore PPE appropriately for the task performed (86.7%, n=39) compared to the younger workers (78.0%, n=85) and the relationship between PPE appropriateness and age of worker was highly significant (x^2=11.420, df=2, n=154, p<.001). Similarly, it was noted that females (85.0%, n=35) wore PPE appropriately for the task performed as compared to their male counterparts (76.1%, n=35) and the relationship between appropriateness of PPE for the task performed and the gender was significant (x^2=12.603, df=1, n=154, p=.048). Majority of workers with work experiences above 6 years utilized PPE appropriately for the task performed (82.5%, n=33) as compared to those with less work experiences (77.2%, n=88). There was a significant relationship between PPE appropriateness in usage for the task performed and the experience of the workers (x^2=16.6, df=2, n=154, p<.001).

Table 4. 11: Relationship between PPE Worn Correctly and Socio Demographics

PPE worn correctly; N=154			
	Yes	No	
18 - 35 years	89(80.2%)	22(19.8%)	x^2=5.998, df=2, p=.049
35 - 50 years	38(88.4%)	5(11.6%)	
Total	**127(87.5%)**	**27(12.5%)**	
Gender			
Female	38(92.0%)	3(8.0%)	x^2=3.302, df=1, p=.069
Male	93(81.9%)	20(18.1%)	
Total	**131(85.5%)**	**23(14.5%)**	
Length of service			
3 months – 6 years	84(72.4%)	18(17.6%)	x^2=10.725, df=2, p=.005
Above 6 years	46(88.5%)	6(11.5%)	
Total	**130(87.5%)**	**24(12.5%)**	

The study results generally show that majority of the workers wore their PPE correctly (87.5%, n=127). However, further scrutiny revealed that majority of the workers below 35yrs did not wear them correctly (19.8%, n=22) as compared to those above 35 years who had majority wearing them correctly (88.4%, n=38) and the relationship between correctness in wearing PPE and the age of workers was significant (x^2=5.998, df=2, n=154, p=.049). More females (92.0%, n=38) emerged to wear PPE correctly as compared to their male counterparts (81.9%, n=93) although the relationship between the PPE wearing correctness and workers' gender was not significant (x^2=3.302, df=1, n=154, p=.069). Workers with over 6 years length of service emerged to have worn PPE more correctly (88.5%, n=46) as compared to those with less than 6 years work experience (72.4%, n=84) and the relationship between correctness in PPE wearing and work experience was significant (x^2=10.725, df=2, n=154, p=.005).

Table 4. 12: Relationship between PPE Fitting Correctly and Socio Demographics

PPE fitting correctly; N=154			
Age	Yes	No	
18 - 35 years	91(84.3%)	17(15.7%)	x^2=1.255, df=2, p=.534
35 - 50 years	41(89.1%)	5(10.9%)	
Total	**132(85.7%)**	**22(14.3%)**	
Gender			
Female	36(89.0%)	5(11.0%)	x^2=5.302, df=1, p=.0.021
Male	95(83.9%)	18(16.1%)	
Total	**131(85.7%)**	**23(14.3%)**	
Length of service			
3 months – 6 years	86(82.7%)	18(17.3%)	x^2=2.4, df=2, p=.301
Above 6 years	44(88.0%)	6(12.0%)	
Total	**130(85.7%)**	**24(14.3%)**	

The study result shows that majority of the workers confirmed that their PPE fitted them correctly (85.7%, n=132). However, further scrutiny revealed that majority of the workers above 35yrs (89.1%, n=41) approved the PPE fitness more than those below 35years of age. However, there was no significant relationship between PPE correct fitness and age of workers (x^2=1.255, df=2, n=154, p=.534). More female workers (89.0%, n=36) confirmed their PPE fitted them correctly than their male counterparts (83.9%, n=95) and the relationship between PPE correct fitness and the gender of the workers was significant (x^2=5.302, df=1, n=154, p=.0.021). Workers with over 6years work experiences confirmed more correct PPE fitness (88.0%, n=44) compared to those with less than 6years experience (82.7%, n=86). However, there was no significant relationship between PPE correct fitting and work experiences (x^2=2.4, df=2, n=154, p=.301).

Table 4. 13: Relationship between PPE in Good Working Condition and Socio Demographics

PPE in good working condition; N=154			
Age	Yes	No	
18 - 35 years	88(76.0%)	17(24.0%)	x^2=7.302, df=2, p=.026
35 - 50 years	39(95.1%)	2(4.9%)	
Total	**127(83.9%)**	**27(16.1%)**	
Gender			
Female	86(92.0%)	3(8.0%)	x^2=11.302, df=1, p<.001
Male	38(76.0%)	27(24.0%)	
Total	**124(83.9%)**	**30(16.1%)**	
Length of service			
3 months – 6 years	83(80.6%)	20(19.4%)	x^2=7.202, df=2, p=.027
Above 6 years	45(88.2%)	6(11.8%)	
Total	**128(83.9%)**	**26(16.1%)**	

The above results generally shows that majority of the workers confirmed their PPE were in working good conditions (83.9%, n=127). However, further scrutiny revealed that majority of the workers above 35yrs confirmed their PPE' good working conditions (95.1%, n=39) than their younger counterparts (76.0%, n=88). There was a significant relationship between PPE good working condition and the workers' age (x^2=7.302, df=2, n=154, p=.026). In addition, majority of female workers (92.0 %, n=86) had their PPE in good working conditions compared to fewer male workers (76.0%, n=38). The relationship between PPE in good working condition and the worker's gender was significant (x^2=11.302, df=1, n=154, p<.001). Similarly, workers with over 6years length of service had more confirmations of the PPE good conditions (88.2%, n=45) than their less experienced counterparts (80.6%, n=83). The relationship between PPE in good working condition and worker's experience was a significant (x^2=7.202, df=2, n=154, p=.027).

4.5.4 Frequency of Use of PPE

Consistent and appropriate use of PPE is important in preventing occupational injuries and illnesses hence this was explored among the respondents and the results presented in figure 8.

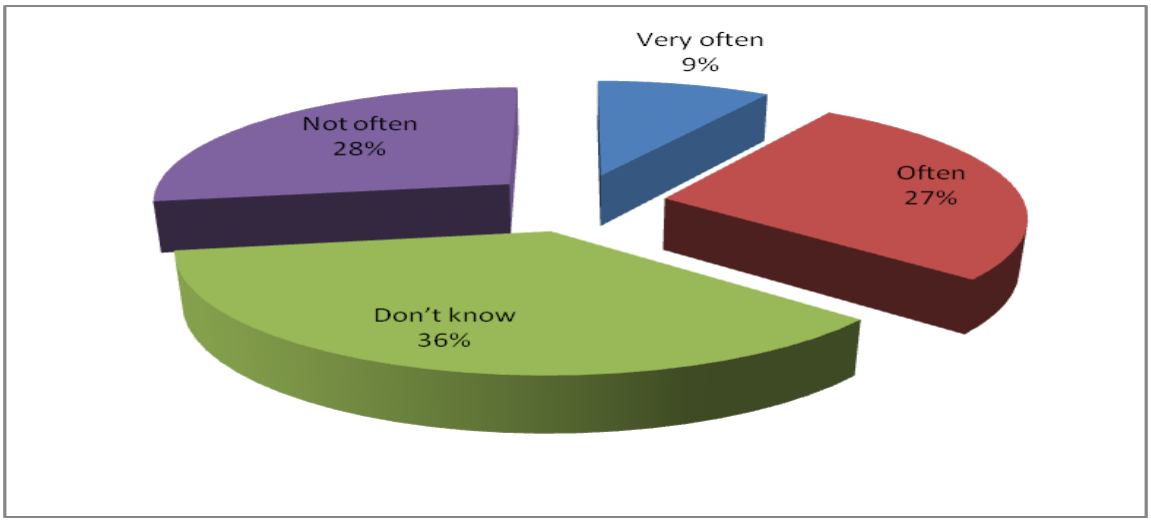

Figure 4. 8: Frequency of use of PPE

From the above results, majority of the workers 36% (n=123) did not know how often they use PPE to prevent injuries and illnesses, an indication that sometimes they work without them thus exposing themselves to injuries and illnesses as a result of not using PPE appropriate and consistent. A higher number of workers 27% (n=92) reported using PPE often only 9% (n=31) of all the workers reported using PPE all the time appropriate and consistently. This is a clear indication of the importance of using PPE because out of the 342 respondents who were sampled in this study a significant number of 157 have been injured at one point in time.

4.5.5 Prevention of work Related Injuries and Illnesses

This is important because it helps to reduce most of the work related injuries and illnesses. When asked about the different ways they use to prevent work related injuries and illness, the responses were presented in Figure 4.9.

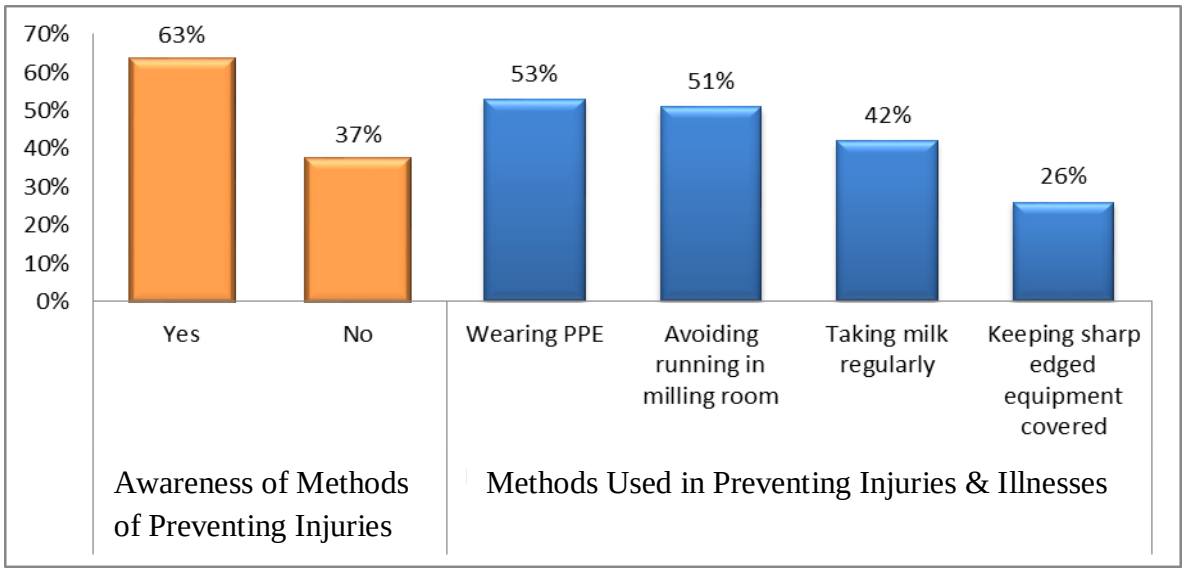

Figure 4. 9: Prevention of Work-related Injuries and illnesses

Majority of the workers 63% (n=216) were aware of how work-related injuries and illnesses they are exposed to may be prevented. Workers (53% n=181) said they used PPE more than the other preventive methods and keeping sharp edged equipment covered (26% n=89) was the least practiced method.

4.6 Factors Influencing Use of PPE among the Study Respondents

There are many factors that may influence use of PPE, these includes; availability, accessibility, comfort, PPE hotness, attractive among others. Workers were asked to state the factors influencing the use of PPE and the responses were compared with the respondents' age, gender and length of service in the industry.

4.6.1 Socio Demographic Factors Influencing Use of PPE

Respondents were asked to state the factors which influenced use of PPE and results are shown below in table 4.14 to 4.23.

Table 4. 14: Relationship between Comfort in using PPE and Socio Demographics

Characteristic percentage of the respondents; N=317			
Age group	YES	NO	
18 - 35 years	203(86.0)	33(14.0%)	x^2=16.819, df=2, p<.001
35 - 50 years	43(53.1%)	38(46.9%)	
Total	**246(81.7%)**	**71(18.3%)**	
Gender			
Male	162(93.0%)	12(7.0%)	x^2=6.009, df=1 p=.014
Female	107(75.0%)	36(25.0%)	
Total	**269(81.7%)**	**48(18.3%)**	
Length of service			
3 months – 6 years	166(82.6%)	35(17.4%)	x^2=1.11, df=2, p=.574
Above 6 years	80(74.8%)	27(25.2%)	
Total	**256(81.7%)**	**61(18.3%)**	

The study results generally showed that majority of the workers confirmed their comfort with using PPE (81.7%, n=246). Further scrutiny revealed that majority of the workers below 35yrs confirmed comforts with using PPE (86.0%, n=203) compared to the older workers (53.1%, n=43) and the relationship between comfort in using PPE and age of the workers was highly significant (x^2=16.819, df=2, p<.001). In addition, male workers (93.0%, n=162) reported comfort in using PPE as compared to their female counterparts (75.0%, n=107) and the relationship between comfort in using PPE and the gender of workers was significant (x^2=6.009, df=1 p=.014). Workers with less than 6 years of experience reported comforts in using PPE (82.6%, n=166) compared to those with longer work experiences (74.8%, n=80) although the relationship between levels of comfort in using PPE and work experience was not significant (x^2=1.11, df=2, p=.574).

Table 4. 15: Relationship between Lack of Awareness on PPE use and Socio Demographics

Characteristic percentage of the respondents; N=317			
Age group	Yes	No	
18 - 35 years	104(52.3%)	95(47.7)	x^2=19.9, df=2, p<.001
35 - 50 years	88(74.6%)	30(25.4%)	
Total	**192(54.6%)**	**125(45.4%)**	
Gender			
Male	58(32.9%)	117(67.1%)	x^2=5.302, df=1, p=.021
Female	71(50.0%)	71(50.0%)	
Total	**129(45.4%)**	**188(54.6%)**	
Length of service			
3 months – 6 years	108(50.5%)	106(49.5%)	x^2=2.725, df=2, p=.256
Above 6 years	25(24.3%)	78(75.7%)	
Total	**133(45.4%)**	**184(54.6%)**	

Majority of the workers were not aware of the importance of PPE use (54.6%, n=192). In addition those above 35yrs (74.6%, n=88) were not aware about importance of PPE use compared to the younger ones (52.3%, n=104). The relationship between awareness on PPE use and the age of respondents was significant (x^2=19.9, df=2, p<.001). Furthermore, female workers (50.0%, n=71) reported lack of the awareness on PPE use as compared to the male workers (32.9%, n=58) and the relationship between awareness on PPE use and the gender of the workers was significant (x^2=5.302, df=1, p=.021). Workers with less than 6 years experience were not aware on the importance of PPE use (50.5%, n=108) compared to those with more work experience. However, these results showed no significant relationship between awareness on PPE use and the experience of the workers (x^2=2.725, df=2, p=.256).

Table 4. 16: Relationship between Perception that Brief Tasks are less Risky and Socio Demographics

Characteristic percentage of the respondents; N=317			
Age group	Yes	No	
18 - 35 years	58(28.4%)	146(71.6%)	x^2=2.420, df=2, p=.298
35 - 50 years	35(31.0%)	78(69.0%)	
Total	**93(18.3%)**	**224(81.7%)**	
Gender			
Male	19(11.0%)	156(89.0%)	x^2=1.603, df=1, p=.206
Female	36(25.0%)	107(75.0%)	
Total	**55(18.3%)**	**262(81.7%)**	
Length of service			
3 months – 6 years	32(15.3%)	174(85.7%)	x^2=16.6, df=2, p<.001
Above 6 years	62(55.9%)	49(44.1%)	
Total	**94(18.3%)**	**223(81.7%)**	

Majority of the workers perceived brief tasks as more risky (81.7%, n=224). Further scrutiny revealed that majority of the workers below 35yrs confirmed their perception that brief tasks are more risky (71.6%, n=146) compared to their older counterparts (69.0%, n=78). However, the relationship between age and the perception was not significant (x^2=2.420, df=2, p=.298). Male workers perceived brief tasks as more risky (89.0%, n=156) than the females but the relationship between gender and the risk perception was not significant (x^2=1.603, df=1, p=.206). Workers who had worked for less than 6 years (85.7%, n=174) highly perceived brief tasks as riskier than those who had worked for longer periods. The relationship between brief tasks risky perception and the workers' work experiences was highly significant (x^2=16.6, df=2, p< 0.001).

Table 4. 17: Relationship between PPE Acceptability and Socio Demographics

Characteristic percentage of the respondents; N=317			
Age group	Yes	No	
18 - 35 years	100(43.7%)	129(56.3%)	x^2=11.72, df=2, p=.016
35 - 50 years	67(76.1%)	21(23.9%)	
Total	**167(52.7%)**	**150(47.3%)**	
Gender			
Male	118(67.4%)	57(32.6%)	x^2=8.88, df=1, p=.002
Female	50(35.2%)	92(64.8%)	
Total	**168(53.0%)**	**149(47.0%)**	
Length of service			
3 months – 6 years	112(52.3%)	102(47.7%)	x^2=3.899, df=2, p=.034
Above 6	65(63.1%)	38(36.9%)	
Total	**177(55.8%)**	**140(44.2%)**	

The results above generally showed that majority of the workers, confirmed to have accepted use of PPE (52.7%, n=167). Further scrutiny revealed that workers above 35yrs confirmed to have accepted use of PPE at their place work (76.1%, n=67) compared to their counterparts below 35 years (43.7%, n=100) but there was no statistical significant relationship between PPE acceptability and age of the workers (x^2=2.720, df=2, p=.162).The study also revealed that majority of the male workers to have accepted use of PPE at their workplace (67.4%, n=118) and the relationship between the PPE acceptability and gender was significant (x^2=8.88, df=1, p=.002). Similarly, workers who had worked for over 6 years felt there was no need to use PPE at their work place (63.1%, n=65) as compared to those with less work experience (52.3%, n=112), the relationship between PPE acceptability and length of service was significant (x^2=3.899, df=2, p=.034).

Table 4. 18: Relationship between Lack of Coworker/Supervisor Influence to Using PPE and Socio Demographics

C**haracteristic percentage of the respondents; N=317**			
Age group	Yes	No	
18 - 35 years	186(91.6%)	17(8.4%)	x^2=2.255, df=2, p=.324
35 - 50 years	80(70.8%)	33(29.2.0%)	
Total	**266(90.9%)**	**51(9.1%)**	
Gender			
Male	115(65.9%)	60(34.1%)	x^2=2.30, df=1, p=.129
Female	133(94.0%)	9(6.0%)	
Total	**248(90.9%)**	**69(9.1%)**	
Length of service			
3 months – 6 years	174(87.0%)	26(13.0%)	x^2=1.414, df=2, p=.493
Above 6 years	101(94.4%)	6(5.6%)	
Total	**285(90.9%)**	**32(9.1%)**	

Majority of the workers confirmed lack of coworker's /supervisor's influence to using PPE (90.9%, n=266). Further scrutiny revealed that workers below 35yrs confirmed lack of coworker /supervisor influence to using PPE (91.6%, n=186) but the relationship between coworker /supervisor's influence using PPE and age was not significant (x^2=2.255, df=2, p=.324). Female workers and those above 6 years working experiences reported lack of coworker /supervisor influences to using PPE (94.0%, n=133;94.4%, n=101) than the males and those with less work experiences (94.0%, n=133; 87.0%), n=174) respectively. However, the coworker/supervisor influence to using PPE was not significantly associated to the gender and length of service of the workers (x^2=2.30, df=1, p=.129 and x^2=1.414, df=2, p=.493) respectively.

Table 4. 19: Relationship between PPE Hot to Use and Socio Demographics

Characteristic percentage of the respondents; N=317			
Age group	Yes	No	
18 - 35 years	138(64.2%)	77(35.8%)	x^2=3.302, df=2, p=.050
35 - 50 years	59(60.2%)	39(39.8%)	
Total	**201(63.4%)**	**116(36.6%)**	
Gender			
Male	156(89.0%)	19(11.0%)	x^2=11.313, df=1, p<.001
Female	71(50.0%)	71(50.0%)	
Total	**227(63.4%)**	**90(36.6%)**	
Length of service			
3 months – 6 years	131(63.0%)	77(37.0%)	x^2=2.202, df=2, p=.3325
Above 6 years	43(39.4%)	66(60.6%)	
Total	**174(63.4%)**	**143(36.6%)**	

From the above results majority of the workers, confirmed they felt hot when wearing PPE (63.4%, n=201). Further scrutiny revealed that workers below 35yrs confirmed PPE hotness (64.2%, n=138) compared to their older counterparts (60.2%, n=59). However, this association was not significant (x^2=3.302, df=2, p=.069). More males (89.0%, n=156) reported PPE hotness in use as compared to their female counterpart at (50.0%, n=71) and the relationship between PPE hotness and the gender of the workers was significant (x^2=10.38, df=1, p<.001). Workers who had worked for less than 6 years (63.0%, n=131) reported PPE being hot to use but the relationship the relationship between PPE hotness and the work experience was not significant (x^2=2.202, df=2, p=.3325).

Table 4. 20: Relationship between PPE Fitness and Socio Demographics

Characteristic percentage of the respondents PPE fitness N=317			
Age group	Yes	No	
18 - 35 years	97(42.4%)	132(57.6%)	x^2=2.310, df=2, p=.192
35 - 50 years	70(87.0%)	18(13.0%)	
Total	**167(54.9%**	**150(45.1%)**	
Gender			
Male	60(34.1%)	115(65.9%)	x^2=2.308, df=1, p=.1.26
Female	89(62.5%)	53(37.5%)8	
Total	**149(54.9%)**	**168(45.1%**	
Length of service			
3 months – 6 years	109(50.9%)	105(49.1%)	x^2=3.102, df=2, p=.038
Above 6 years	68(66.0%)	35(34.0%)	
Total	**177(54.9%)**	**140(45.1%)**	

The results above shows that for majority of the workers, their PPE fitted them (54.9%, n=167). Further scrutiny revealed that workers above 35yrs confirmed that PPE fitted them (87.0%, n=70) compared to their counterparts below 35 years (42.4%, n=97) but there was no statistical significant relationship between PPE fitness and age of the workers (x^2=2.310, df=2, p=.192). The study also revealed that majority of the male workers had their PPE not well fitting (65.9%, n=115) and the relationship between the PPE fitness and gender was significant (x^2=10.38, df=1, p<.001). Majority of the workers who had worked over 6 years felt that PPE fitted properly hence they used them (66.0%, n=68) as compared to their younger counterparts (50.9%, n=109), the relationship between PPE fitness and worker experience was significant (x^2=3.102, df=2, p=.038).

Table 4. 21: Relationship between PPE Availability and Socio Demographics

Characteristic percentage of the respondents; **N=317**			
	Yes	No	
18 - 35 years	78(36.1%)	138(68.9%)	x^2=12.322, df=2, p=.003
35 - 50 years	20(19.0%)	81(81.0%)	
Total	**98(27.4%)**	**219(72.6%)**	
Gender			
Male	21(12.0%)	154(88.0%)	x^2=11.302, df=1, p<.001
Female	53(37.5%	89(62.5%)	
Total	**74 (27.4%)**	**243(72.6%)**	
Length of service			
3 months – 6 years	77(37.2%)	130(62.8%)	x^2=11.112, df=2, p=.004
Above 6 years	22(20.0%)	88(80.0%)	
Total	**99(27.4%)**	**218(72.6%)**	

Majority of the workers confirmed that PPE were not available (72.6%, n=219). Workers above 35years confirmed PPE' unavailability (81.0%, n=81) and the relationship between the PPE availability and age was significant (x^2=12.322, df=2, p=.003). Similarly, female workers confirmed PPE' unavailability (62.5%, n=89) and the relationship between the PPE availability and gender was significant (x^2=11.302, df=1, p<.001). Majority of workers with over 6years work experience confirmed PPE not available (80.0%, n=88) and the relationship between the PPE availability to and work experience was significant (x^2=11.112, df=2, p=.004).

Table 4. 22: Relationship between PPE Attractiveness and Socio Demographic

Characteristic percentage of the respondents; N=317			
	Yes	No	
18 - 35 years	67(31.2%)	148(68.8%)	x^2=12.402, df=2, p=.002
35 - 50 years	58(56.9%)	44(43.1%)	
Total	**125(27.4%)**	**192(72.6%)**	
Gender			
Male	60(34.1%)	115(65.9%)	x^2=10.597, df=1, p=.0.005
Female	36(25.0%)	107(75.0%)	
Total	**95(27.4%)**	**222(72.6%)**	
Length of service			
3 months – 6 years	62(29.1%)	151(70.9%)	x^2=11.242, df=2, p=.004
Above 6 years	69(60.5%)	45(39.5%)	
Total	**131(27.4%)**	**186(72.6%)**	

Majority of the workers felt that PPE were not attractive (72.6%, n=192) hence they did want to use them. Further scrutiny revealed that majority of the workers below 35yrs confirmed PPE' unattractiveness (68.8%, n=148) and the relationship between the PPE attractiveness and age was significant (x^2=12.402, df=2, p=.002). Female workers confirmed PPE' unattractiveness (75.0%, n=107), the relationship between PPE attractiveness and gender was significant (x^2=1.597, df=1, p=.0005). Finally, majority of the workers with less than 6years work experiences confirmed PPE' not being attractive (70.9%, n=151) and the relationship between the PPE attractiveness and length of service was significant (x^2=11.242, df=2, p=.004).

Table 4. 23: Relationship between not using PPE despite being trained and aware of the hazards and Socio Demographics (Ignorance)

Characteristic percentage of the respondents; Not using PPE despite being trained and aware of the hazards (Ignorance) N=317			
	Yes	No	
18 - 35 years	71(34.0%)	138(66.0%)	x^2=7.313, df=2, p=.026
35 - 50 years	35(33.0%)	73(67.0%)	
Total	**106(45.1%)**	**211(54.9%)**	
Gender			
Male	121(69.0%)	54(31.0%)	x^2=9.302, df=1, p=.002
Female	36(25.0%)	107(75.0%)	
Total	**156(45.1%)**	**161(54.9%)**	
Length of service			
3 months – 6 years	75(36.4%)	131(63.6%)	x^2=12.187, df=2, p=.002
Above 6 years	81(73.0%)	30(27.0%)	
Total	**156(45.1%)**	**161(54.9%)**	

The above study results generally showed that majority of the workers disagreed with the statement that they were not using PPE despite being trained and aware of the hazards (54.9%, n=211). This means that they were using PPE as trained because they were also aware of the hazards. Workers above 35yrs confirmed to be using PPE as trained because they were aware of the hazards (67.0%, n=73), the relationship between PPE use and hazard awareness and age was significant (x^2=7.313, df=2, p=.026). In addition, while majority male workers (69.0%, n=121) reported that they were not using PPE despite being trained and aware of the hazards, on the other hand, majority of female workers (75.0%, n=107) confirmed to be using PPE due to level of training and hazard awareness. The results showed there was a significant relationship between the use of PPE due to training and hazard awareness and gender of the workers (x^2=9.302, df=1, p=.002). In addition, majority of workers with over 6years work experience reported not using PPE despite being trained and aware of the hazards (73.0%, n=81) while majority of those below 6years work experience reported to be using PPE due to training and

awareness of the hazards (63.6%, n=131). This relationship was significant (x^2=12.187, df=2, p=.002).

4.7 Test of the Study Hypothesis

The study hypothesis was stated in a compound manner to test three hypotheses in one statement. Each of the hypotheses is tested and outcome discussed below.

Table 4. 24: Relationship between PPE Utilization and Availability, Accessibility, and consistency in Usage.

PPE Utilization N=317			
Availability	Yes	No	Chi-square
Yes	132(60.3%)	87(39.7%)	x^2=8.54, df=1, p=.002
No	11(11.2%)	87(88.8%)	
Total	**143(45.1%)**	**174(54.9%)**	
Accessibility			
Yes	58(66.7%)	29(33.3%)	x^2=7.20, df=1, p=.003
No	85(37.0%)	145(63.0%)	
Total	**143(45.1%)**	**174(54.9%)**	
Consistency			
Yes	57(49.6%)	58(50.4%)	x^2=1.446, df=1, p=.229
No	86(42.6%)	116(57.4%)	
Total	**143(45.1%)**	**174(54.9%)**	

Majority of the workers reported that PPE was available in their work places and were using them at the time of the study (60.3%, n=132 and the relationship between PPE availability and PPE utilization was significant (x^2=8.54, df=1, p=.002). The above results further showed that for majority of the workers, PPE was not accessible (63.0%, n=145). The relationship between PPE utilization and accessibility was also significant (x^2=7.20, df=1, p=.003). Further scrutiny revealed that majority of the workers were not consistent in using PPE (57.4%, n=116). However, the relationship between PPE usage and consistency of use was not significant (x^2=1.446, df=1, p=.229).

CHAPTER FIVE: DISCUSSION, CONCLUSION AND RECOMMENDATION

5.1 Discussion

This chapter presents discussion of results in relation to the study results and the objectives. The main objective of the study was to assess utilization of PPE among workers in grain and oil seed milling industries in Nairobi City County, Kenya. It specifically sought to establish the common types of self reported occupational injuries and illnesses, the level of use of PPE and the factors influencing utilization of PPE among workers in grain and oilseed milling industries. Out of a total 342 questionnaires administered were returned, all of them were returned, cleaned and coded for analysis. This gives a response rate of 100% although in some questions the response rate varied between 92% with lowest response rate being 45% which was adequate for this study according to Kathori (2004).

5.1.1 Socio-demographic Characteristics of the Workers

As it is generally accepted that there is significance difference in gender in occupations, similarly, the results of these study showed male predominance with 57.4%. Majority of the respondents in this study were youthful (59.9%) and married (72.9%). They were mainly high school (36.3%) and tertiary certificate (27.4%) holders. Most of the workers had in the average worked for at least 6 years (70.6%). The study also revealed an average mean age of ±25 years. Therefore, the sample was generally adequate for this type of study, gender balanced and comprised of experienced and knowledgeable respondents in matters of PPE utilization and occupational hazards. These results are consistent with other studies which were conducted elsewhere by Troung et al., (2009) and Magoro (2012).

5.1.2 Common Types of Self Reported Occupational Injuries and Illnesses among Workers

The study sought to identify the nature of occupational injuries and common illnesses experienced by the workers. Generally, the results established that a large number of respondents (45.1%) had suffered various forms of injuries in the last one year prior to data collection. Abrasions, cuts, burns and fractures had a significant association with use of PPE. However, having suffered punctures was not significantly associated with use of PPE. The study further found out that men suffered more injuries than women; workers below 35 years suffered more injuries as well as those who had worked for less than 6years. This can be attributed to male aggressiveness in working and ignorance on PPE use, negative attitude towards PPE use among the young workers or even lack of awareness on the importance of PPE use among workers who had worked for less than 6years in their respective industries. These results are consistent with a study done by BLS (2010) on poor compliance to use of PPE at the work place among workers in grain industries which resulted to occupational injuries and illnesses.

The International Classification of Diseases (ICD) classifies body parts affected by injuries into six parts namely, head, arm, legs, back, neck and chest, the study results revealed that the parts of the body that were most affected by injuries included head (74%), arms (68%), legs (62%), and chest (46%). Majority of the workers who suffered head injuries confirmed to have ignored wearing head gears because they make them feel uncomfortable and are usually hot to wear. These results contradict those of Department of Environmental Health in the Ministry of Health in Ethiopia (2008) because the results listed fingers, hands, lower legs and eyes, as the most commonly affected parts of the body among workers in these industries. Based on the respondents' opinions, most injuries were caused by body stress (74%) followed by knocks by objects (54%), and inhaling a substances (45%). Majority confirmed body stress as the main

cause of injuries because they worked for long hours and sometimes in uncomfortable position which resulted to fatigue. Others confirmed that mere ignorance of the need to put on PPE exposed them to the injuries. These results are similar to those of Procter (2007) who observed that workers involved in lifting, carrying and putting down objects as well as maintenance of machines are at risk of developing musculoskeletal injuries because they have to work long hours in uncomfortable positions, lift and carry heavy objects while others are involved in maintaining machines that are difficult to access or enter confined spaces.

In regards to the types of occupational illness suffered by the workers in these industries, majority (73%) of the workers indicated that they sought for treatment whenever they became ill and that is how they became aware of their infections status. The most common occupational illnesses cited was asthma (23%) due to inhalation of flour dust from the grains during the time of milling and skin dermatitis (18%) resulting from coming into contacts with flour dust and cleaning materials. The least cited was hearing loss (9%) which was mainly caused by loud noise produced by the milling machines. These results are in agreement with a study done by Jeebhy (2005) which indicated that worldwide the most common reported causes of occupational allergies and asthma among workers in food industries are agents of biological origin such as cereal flours, enzymes and rubber latex. The study is also in consistent with that done by HSE, (2008) which noted that dust from these industries can also cause respiratory problems such as occupational asthma as well as irritations of eyes, nose and skin.

5.1.3 The Level of Use of PPE among the Workers

In this study less than half of the workers (45.1%) were found to be using PPE. This data agrees with studies done by OSHC (2000) and Magoro (2012) which found out that less than half of the workers were using PPE. The common types of PPE used by the workers in this study included;

hand gloves (63%) dust masks (59%), overalls (53%), dust coats (46%) and safety boots (39%.) Further the study result showed that majority of the workers confirmed that available PPE were appropriate for the tasks performed (80.6%), fitted them correctly (85.7%), they wore them correctly (87.5%) and were of good working conditions (83.9%), Similar results were found by HSE (2012) who observed the same PPE used and their conditions in these food industries. The training strategies that are used to enhance the level of use of PPE, on job training was rated the highest (68%) followed by apprenticeship (62%) with college/university being rated lowest at (28%). In regard to the frequency of use of PPE, majority of the workers (36%) did not remember the last time they used PPE, with only (27%) reported to using PPE often and only (9%) were using PPE very often and consistently. The results agree with those of Chepkener (2013) and BLS (2010).

While majority of the workers confirmed to knowing how work-related injuries and illnesses they are exposed to may be prevented (63%), only 53% of them regarded wearing of PPE as the most practiced measure. Other workers mentioned avoiding running in milling rooms (51%), taking milk regularly (42%) and keeping sharp edged equipment covered (26%) as the most practiced measures of preventing work related injuries and illnesses**.** These results are in agreement with those of Megan (2004) and OSHC (2000) who noted that PPE is the final barrier against occupational hygiene hazards.

From the study results, it emerged that majority of the workers (37%) were only assisted by their fellow workers when they became injured in line of duty, with (27%) being assisted by health officer and (9%) tied with those assisted by managers and not assisted at all. After the workers were injured, being referred to hospital was rated the highest at (90%), followed by those given first aid before being referred to hospital at (88%) while the minority (44%) were given unpaid

days off from duty until they recover and are able to resume work. This result contradict those done by MOH, Ethiopia (2008) where majority of the workers once injured they were given first aid by the managers and supervisors before being referred to hospital for further treatment.

5.1.4 Socio Demographic Factors influencing Use of PPE among the Workers

There are many reasons that were found to answer why PPE compliance remained low among the workers even when they are provided, these include discomfort (81.1%), lack of awareness about PPE usage in their working environments (54.6%), PPE hot to use (63%), PPE not fitting well (54.9%), PPE not attractive (72.6%) and PPE unavailable (72.6%) among others. Similarly majority of the workers disagreed with the statement that they were not using PPE despite being trained and aware of the hazards (54.9%). This means that they were using PPE as trained because they were also aware of the hazards but this did not translate to use of PPE effectively and consistently. These factors are similar to those observed by Lombardi *et al*, (2009) and Macpherson, (2007) who sought to answer why PPE compliance remains low, even in settings where PPE is available, and as to whether the usage and benefits of PPE are known.

5.1.5 Test of Hypothesis

In this study, the test of hypotheses indicated that PPE utilization was significantly influenced by availability and accessibility. However, the relationship between PPE utilization and consistency of its use was not significant.

5.2 Conclusions

The aim of the study was to assess utilization of PPE among workers in grain and oilseed milling industries in Nairobi City County in Kenya. Based on the results, it can be concluded that these industries are dominated by youthful workers who are male, married and holder of basic

secondary education and technical certificates. The workers in these industries suffered from cuts, abrasions, burns, fractures and punctures. The common illnesses suffered included asthma, skin dermatitis and hearing loss.

The most affected parts of the body were found to be the head, arms, legs, and chest. Head injuries are the most common due to body stress and knocks by objects. It also emerged that majority of the workers were assisted by their fellow workers after being injured with the minority being assisted by the managers. Among the measures taken after injuries or illness included referrals to hospital, which rated highest, first aid, unpaid days off from duty, and paid off days in that order of priority. An unpaid day off until recovery and able to resume work again was also a common practice.

Regarding the level of PPE use, less than half of the workers were found to be using PPE and PPE use was significantly related to age, gender and length of service. The common training strategies used to enhance the level of PPE use among the workers included on-job training and apprenticeship. Majority of the workers did not remember the last time they used PPE with the minority confirming to using PPE very Often and consistently. The various types of PPE used included hand gloves, masks, overall, dust coat and gumboots. PPE appropriateness for the tasks performed and PPE in good working conditions were significantly related to age, gender and length of service. Although there were policy documents regarding PPE utilization in each industry, majority of the workers confirmed they were not using PPE due to lack of encouragement from the management, ignorance and low levels of awareness about the importance of using PPE to prevent injuries and illnesses.

The factors that emerged to significantly influence PPE use and socio demographic characteristics included acceptability, availability, PPE attractiveness, and lack of usage despite being trained and aware of the hazards and not using PPE despite being trained and aware of the hazards (ignorance). There was no significant relationship between use of PPE and lack of co worker/ supervisor influence and socio demographics. PPE Comfort, fitness, lack of awareness and perception that brief tasks are less risky and no need to use PPE emerged to have compound responses that included being significant and not being insignificant in use of PPE and socio demographics.

From the study results it can be concluded that utilization of PPE was significantly influenced by availability and accessibility but there was no significant relationship between utilization and consistency of PPE usage. Therefore, the null hypothesis statement for availability and accessibility was rejected but it was upheld for Consistency in PPE usage.

5.3 Recommendations

Based on the study results and conclusions drawn from the study, the following are the recommendations.

1. Employers in these industries should avail and enhance access to PPE for head, arm and legs which emerged to suffer more injuries. Also PPE for ears and eyes should be provided.
2. Employers in these industries should enhance promotion of utilization of PPE through training and awareness campaigns among all the workers as this will help to reduce injuries and illnesses.

3. Employers in these industries need to ensure safe working environment and encourage all workers to use PPE appropriately and consistently at all times so as to prevent injuries and illnesses.
4. Occupational health and safety officers in these industries should do inspections to identify potential health hazards that pose danger to the workers.
5. Employers in these industries should enforce law on PPE compliance by all workers at all times as this will help to increase the level of use of PPE.
6. Employers should ensure that PPE are always available, accessible and used all the times by the workers and that they are in good working conditions, comfortable to wear, properly fitting and attractive to wear as this will promote utilization.
7. Ministry of labour and its partners should carry out capacity building for staffs in these industries to enable them provide more PPE and hence increase its utilization.

5.4 Areas for further research

1. There is need for more comprehensive and cross sectional studies to be conducted to examine the status of utilization of PPE among workers in other industries and at a countrywide scope in Kenya.

2. Similar but longitudinal study in same areas is recommended so as to determine the effect of these injuries and illnesses reported in this study, whether they lead to disability or deaths or even to determine the economic implications of the victims over time.

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APPENDICES

Appendix I: Consent Form

My name is Annah Mumbua and I am a Master's of Public Health student at Kenyatta University. I am carrying out a study to find out the **utilization of personal protective equipment among workers in grain and oil seed milling industries in Nairobi County, Kenya.** I would like to inform you about this study so as to get your consent to participate. This study aims at assessing the factors influencing the use of personal protective equipment among workers in grain and oil seed milling industries in Nairobi County, Kenya.

The study is purely academic and therefore it may not have any direct benefits to you as participant. However, it has indirect benefits whereby its results will inform the researcher on the factors influencing the use of personal protective equipment hence informing the decision making of policy makers on how to increase their utilization. Your participation in this study will not cause any harm, it is free and voluntary but you can also choose to withdraw from the study at any one point if you so wish. The answers to the questions in this study will be kept confidential. No form of identification or even names will be used in the final write up. The questionnaires will be coded and original destroyed after one year.

Are you willing to participate? 1. Yes [ ] 2. No [ ]

Participant's signature_____ date _____

Investigators signature_____ date _____

Appendix II : Questionnaire

Part A: Respondent's Demographic information

1. Age _____
2. Gender _____
3. Marital status _____
4. Job title _____
5. Highest level of education completed
   a) No schooling Certificate [ ]
   b) Primary school Certificate [ ]
   c) Secondary school Certificate [ ]
   d) Vocational (technical college) school Certificate [ ]
   e) Vocational (technical college) Diploma school Certificate [ ]
   f) University Degree Certificate [ ]
6. Length of service in the industry_____

Part B: Common Types of Self Reported Injuries and Illnesses among workers

7. In your opinion, to what extent have your experienced the following types of injuries while doing your work? Please tick the option that best represents your opinion from the choices herein (5-to a very large extent, 4-to a large extent, 3-Neutral, 2-to a low extent, 1- to a very low extent).

	5	4	3	2	1
a) Abrasions					
b) Cuts					
c) Burns					
d) Fractures					
e) Punctures					
f) Air Pollutions					

e) Other (please explain)_____

9. Of the types of injuries you have suffered, to what extent have the following parts of the body been affected? Please tick the option that best represents your opinion from the choices herein (5-to a very large extent, 4-to a large extent, 3-Neutral, 2-to a low extent, 1- to a very low extent).

	5	4	3	2	1
a) Head					
b) Arm					

c) legs					
d) Back					
e) Neck					
f) Chest					

10. Of the injuries suffered, to what extent have they resulted from the following conditions/activities? Please tick the option that best represents your opinion from the choices herein (5-to a very large extent, 4-to a large extent, 3-Neutral, 2-to a low extent, 1- to a very low extent).

	5	4	3	2	1
a) Body stress					
b) Knocked by an object					
c) Exposure to the hazard					
d) Inhaling a substance					

e) Other conditions _____

11. Have you suffered from any occupational illness? Yes [ ] No [ ]
    If yes, which are the most important three?
    a)_____
    b)_____
    c)_____
    Does your company have a health facility? Yes [ ] No [ ]

12. Are you usually attended and treated in the company health facility when you get injured? Yes [ ] No [ ]

13. If yes, which service do you mainly receive? First Aid [ ] Full treatment [ ]

Others_____

14. After suffering injuries or sickness, who took action to assist you?

    Manager [ ]

    Supervisor [ ]

    Health officer [ ]

    Fellow worker [ ]

    Was not assisted [ ]

15. After suffering from injuries, to what extent have you been given the following treatments? Please tick the option that best represents your opinion from the choices herein (5-to a very large extent, 4-to a large extent, 3-Neutral, 2-to a low extent, 1- to a very low extent).

	5	4	3	2	1
a) Given first aid					
b) Told to go to hospital					
c) Told to go home					
d) Given paid days off					
e) Given unpaid days off					
f) Given counselling Sessions					
g) Suspended from work until able to resume work					
h) Nothing					

i) Others_____

Part C: The level of use of PPE among workers

16. In your opinion, to what extent has each of the following training strategies been used for the work you are now doing? Please tick the option that best represents your opinion from the choices herein (5-to a very large extent, 4-to a large extent, 3-Neutral, 2-to a low extent, 1- to a very low extent).

	5	4	3	2	1
a) Vocational school					
b) College/university					
c) By apprenticeship					
d) Self-taught					
e) Trained by the company					

f) Other (please explain)_____

17. Do you know how any of the work-related injuries you are exposed to may be prevented? Yes [ ] No [ ]

18. Which three ways have you mostly practiced to avoid work related injuries (please explain)
a)_____
b)_____
c_____
others _____

19.Have you heard about PPE Yes [ ] No [ ]

20. Is it necessary to always use PPE? 1. Strongly agree [ ] 2. Agree [ ] 3. Don't know [ ] 4. Disagree. [ ] 5. Strongly disagree[ ]

21. How often have you used PPE to prevent injuries? Please tick the option that best represents your opinion.

Very often [ ] Often [ ] Dont know [ ] Not often [ ] Never [ ].

22. Which three personal protective equipments (PPE) have you mostly used
a)_____

b)_____

c)_____

others_____

Part D: Factors influencing the use of PPE among workers

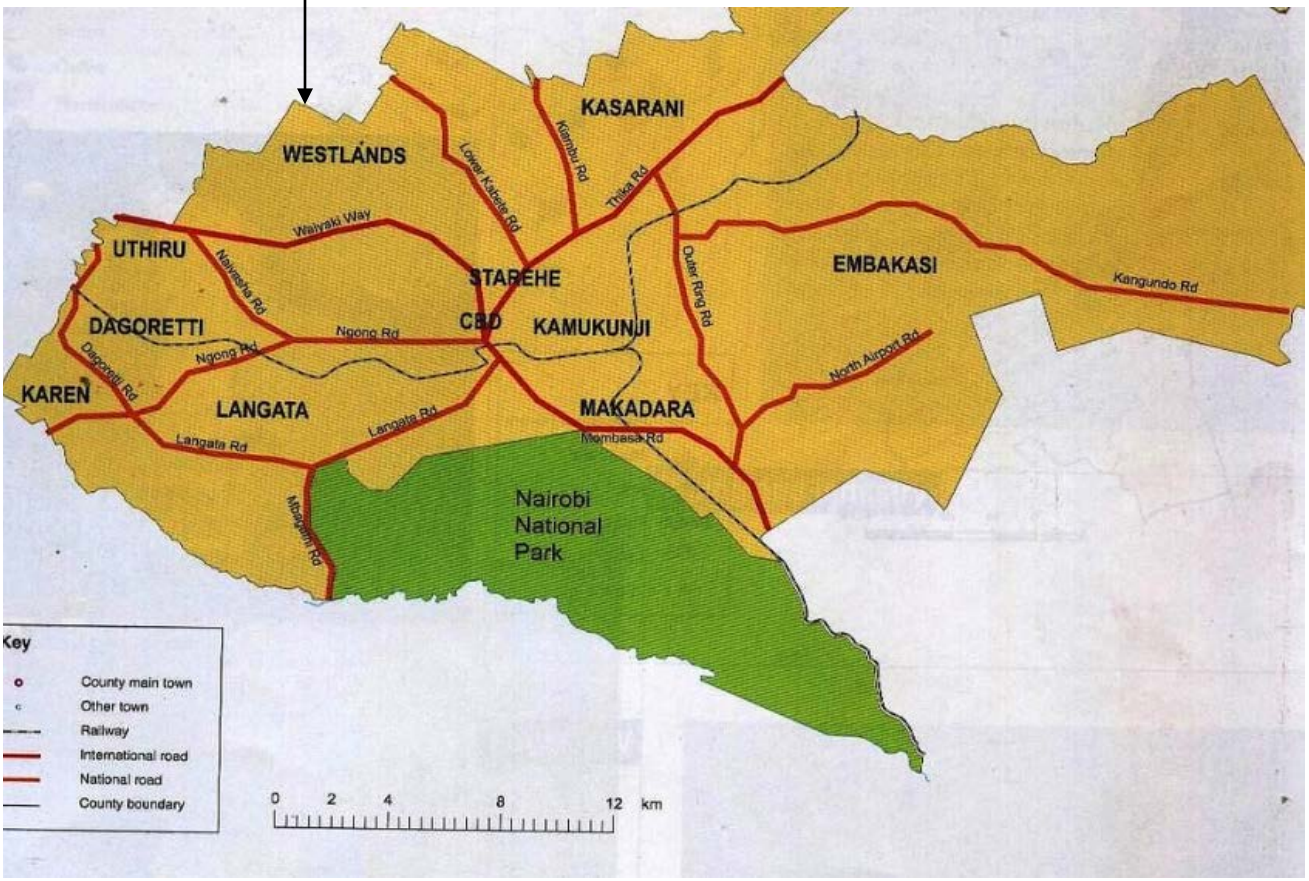
23. How far do you agree with the following statements on the factors affecting use of PPE in your company? Please tick the option that best represents your opinion from the choices herein (5-strongly agree, 4-Agree, 3-Neutral, 2-Disagree and 1- Strongly disagree).

	5	4	3	2	1
a)Workers generally feel comfort in using PPE					
b)Workers lack awareness on PPE use and therefore think it is not necessary to use					
c)Workers perceive brief tasks to be less risky and therefore do not see the need to use it					
d)Workers do not accept to use PPE in their workplace					
e)Lack of coworker/supervisor influence to using PPE					
f)Workers do not use PPE because they feel hot when wearing them					
g)Workers do not use PPE because they do not fit					
h)Workers do not use PPE because they are unavailable					
i)PPE are not used in the food industries because they are not attractive					
j)Workers do not use PPE despite being trained and aware of the hazards (due to negligence)					

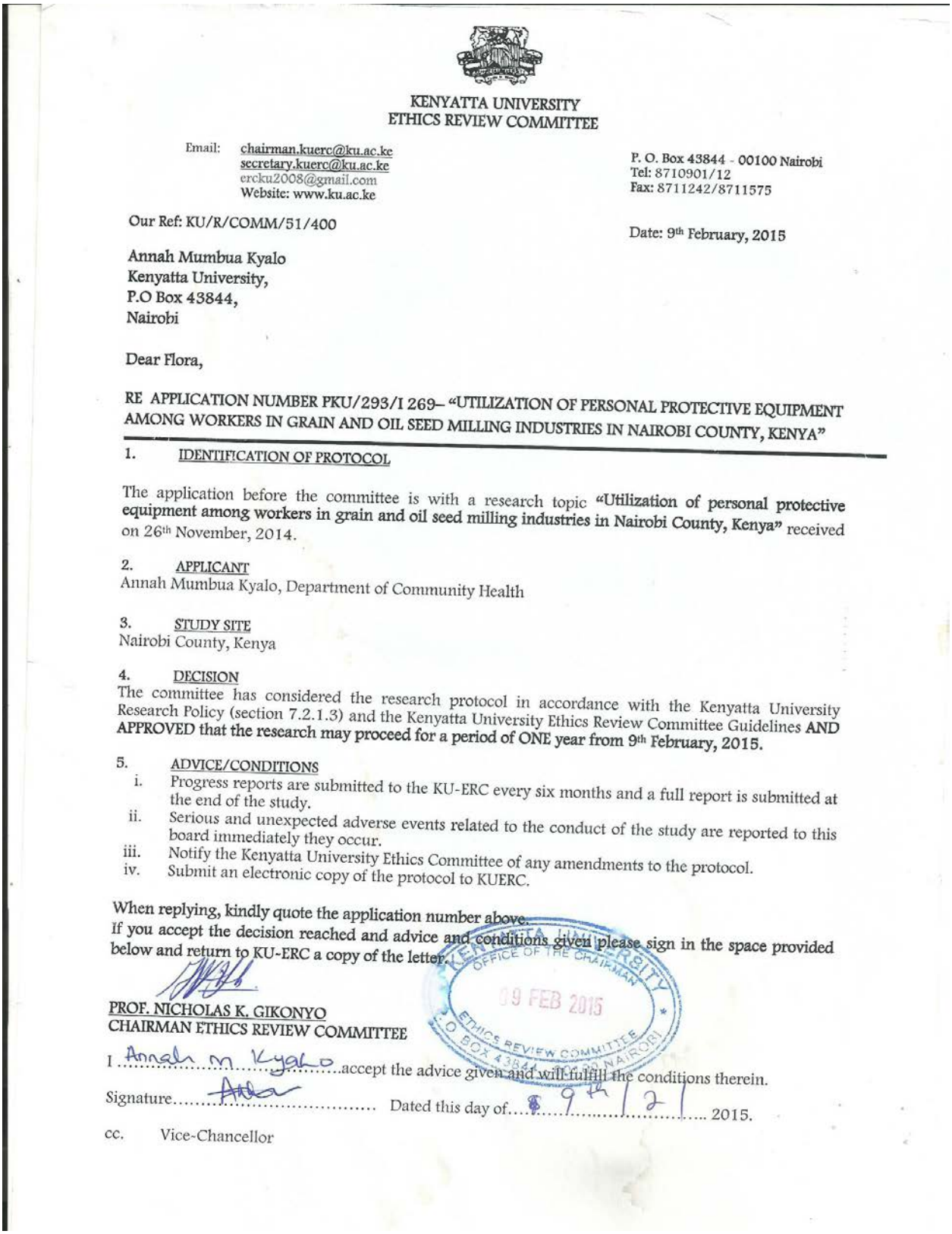
Appendix III: Observation Checklist

NO	PERSONAL PROTECTIVE EQUIPMENT	YES	NO	ADDITIONAL COMMENTS
a.	Does the worker possess any PPE?			
b.	Is he/she using the PPE?			
c.	Is the PPE appropriate for the task being performed?			
d.	Is the PPE worn correctly?			
e.	Is the PPE fitting correctly?			
f.	Is the PPE in good working condition?			

Appendix IV: Map of the Study Area



Appendix V: Ethical Clearance of the Study



KENYATTA UNIVERSITY
ETHICS REVIEW COMMITTEE

Email: chairman.kuerc@ku.ac.ke
secretary.kuerc@ku.ac.ke
ercku2008@gmail.com
Website: www.ku.ac.ke

P. O. Box 43844 - 00100 Nairobi
Tel: 8710901/12
Fax: 8711242/8711575

Our Ref: KU/R/COMM/51/400

Date: 9th February, 2015

Annah Mumbua Kyalo
Kenyatta University,
P.O Box 43844,
Nairobi

Dear Flora,

RE APPLICATION NUMBER PKU/293/I 269– "UTILIZATION OF PERSONAL PROTECTIVE EQUIPMENT AMONG WORKERS IN GRAIN AND OIL SEED MILLING INDUSTRIES IN NAIROBI COUNTY, KENYA"

1. IDENTIFICATION OF PROTOCOL

The application before the committee is with a research topic **"Utilization of personal protective equipment among workers in grain and oil seed milling industries in Nairobi County, Kenya"** received on 26th November, 2014.

2. APPLICANT
Annah Mumbua Kyalo, Department of Community Health

3. STUDY SITE
Nairobi County, Kenya

4. DECISION
The committee has considered the research protocol in accordance with the Kenyatta University Research Policy (section 7.2.1.3) and the Kenyatta University Ethics Review Committee Guidelines **AND APPROVED that the research may proceed for a period of ONE year from 9th February, 2015.**

5. ADVICE/CONDITIONS
i. Progress reports are submitted to the KU-ERC every six months and a full report is submitted at the end of the study.
ii. Serious and unexpected adverse events related to the conduct of the study are reported to this board immediately they occur.
iii. Notify the Kenyatta University Ethics Committee of any amendments to the protocol.
iv. Submit an electronic copy of the protocol to KUERC.

When replying, kindly quote the application number above.
If you accept the decision reached and advice and conditions given please sign in the space provided below and return to KU-ERC a copy of the letter.

KENYATTA UNIVERSITY OFFICE OF THE CHAIRMAN 09 FEB 2015 ETHICS REVIEW COMMITTEE P.O BOX 43844 - 00100 NAIROBI

PROF. NICHOLAS K. GIKONYO
CHAIRMAN ETHICS REVIEW COMMITTEE

I Annah m Kyalo .....accept the advice given and will fulfill the conditions therein.

Signature..... Dated this day of 9th/2/ 2015.

cc. Vice-Chancellor

Appendix VI: Approval for the Study

NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY AND INNOVATION

Telephone: +254-20-2213471,
2241349, 310571, 2219420
Fax: +254-20-318245, 318249
Email: secretary@nacosti.go.ke
Website: www.nacosti.go.ke
When replying please quote

9th Floor, Utalii House
Uhuru Highway
P.O. Box 30623-00100
NAIROBI-KENYA

Ref: No.

Date:

8th April, 2015

NACOSTI/P/15/7573/5361

Annah Mumbua Kyalo
Kenyatta University
P.O. Box 43844-00100
NAIROBI.

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on ***"Utilization of personal protective equipment among workers in grain and oil seed milling industries in Nairobi County, Kenya"*** I am pleased to inform you that you have been authorized to undertake research in **Nairobi County** for a period ending **1st September, 2015.**

You are advised to report to **the Managing Director of selected industry, the County Commissioner and the County Director of Education, Nairobi County** before embarking on the research project.

On completion of the research, you are required to submit **two hard copies and one soft copy in pdf** of the research report/thesis to our office.

DR. S. K. LANGAT, OGW
FOR: DIRECTOR GENERAL/CEO

Copy to:

The Managing Director
Selected Industry.

The County Commissioner
Nairobi County.